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Introduction:
Humans have practiced the use of plants for the cure of diseases for centuries and these plants are highly esteemed all over the world as a rich source of therapeutic agents for the prevention of disease and ailments. The search for eternal health and longevity and for remedies against pain and discomfort drove early man to explore his immediate natural surroundings and led to the use of many plants, animal products, minerals etc. and the development of a variety of therapeutic agents. This evolving practice is recorded in both folklore and books of early practitioners.

Despite decades of dramatic progress in their treatment and prevention, infectious diseases remain a major cause of death and debility and are responsible for worsening the living conditions of many millions of people around the world. Infections frequently challenge the physician’s diagnostic skill and must be considered in the differential diagnoses of syndromes affecting every organ system.

There is continuous increase in the number of multi-drug resistant microbial strains and the appearance of strains with reduced susceptibility to antibiotics. Examples include methicillin-resistant staphylococci, pneumococci resistant to penicillin and macrolides, vancomycin-resistant Enterococci as well as multi-drug resistant gram-negative organisms. There is an urgent need to control antimicrobial resistance by improved antibiotic usage and reduction of hospital cross-infection and search for newer and safer antibiotics.

**Lannea kerstingii** is a tree with a height of 12m and 40cm in diameter, with a wide-spreading and relatively dense crown. The bark is smooth to slightly fissured, fissures spiral around the trunk (spiral grain), pale grey with pinkish,...
white-striped slash.\textsuperscript{[7]} L. kerstingii Engl. and K. Krause (Anacardiaceae) is widely utilized in traditional medicine by various cultures worldwide; a decoction of the back is used to treat swellings,\textsuperscript{[8]} infusion of the back, leaves and bud is used for flatulence, the fruit is used against rickets and scurvy. The plant has been reported for the treatment of diarrhoea,\textsuperscript{[9]} gastritis, rheumatic, sterility, intestinal helminthiasis.\textsuperscript{[10]}

**Materials and Methods:**

Plant material collection and extraction
The plant was collected in May, 2011 at Zaria, Kaduna State, Nigeria. It was then taken to the Herbarium of the Department of Biological Science, Ahmadu Bello University, Zaria for identification. It was identified by comparison with a herbarium specimen (voucher specimen 1832). After identification, the leaves were removed and dried under shade. The size was reduced using mortar and pestle, filtered for homogeneity and kept away from light until further use.

The leaves (100g) was extracted exhaustively using sequential solvent extraction. It was extracted with petroleum-ether followed by methanol using maceration method with intermittent shaking and solvents changed every 1 hour. The maceration process was then repeated several times for exhaustive extraction. The extracts were dried under reduced pressure. The dried methanolic extract (20g) was then dissolved in distilled water and partition using chloroform, and ethylacetate.

**Phytochemical Screening**
Basic phytochemical screening to detect the presence or absence of plant chemical constituents such as alkaloids, tannins, saponins, anthraquinones, flavonoids, cardiac glycoside, anthraquinones, steroids and triterpenoe were carried out using standard procedures\textsuperscript{[11,12]} on the petroleum ether extract, crude methanol extract, chloroform and ethylacetate fractions of the leaves, of L. kerstingii.

**Test Organisms**
Reference strains and clinical isolates: Staphylococcus aureus NCTC6571, Streptococcus faecalis, Bacillus subtilis, Corynобacterium ulcerane, Methicillin-resistant Staphylococcus aureus (MRSA), Escherichia coli NCTC10418, Klebsiella pneumoniae ATCC 10031, Salmonella typhi ATCC 9184, Shigella dysenteriae, Pseudomonas aeruginosa NCTC6750, and fungi Candida albicans, Candida tropicalis and Aspergillus flavus. were obtained from the Department of Pharmaceutical Microbiology, Faculty of Pharmaceutical Sciences, Ahmadu Bello University, Zaria, Nigeria. All the micro-organisms (clinical isolates) were checked for purity and maintained in slants of agar.

Cultivation and Standardization of Test Organism
A loop full of each of the test organisms were taken from the agar slant and sub cultured into test tubes containing 20 ml of sterile nutrient agar (for bacteria) and sabouraud dextrose agar medium (for fungi). The test tubes were then incubated for 24 hours at 37°C for two days (for bacteria) and 27°C for 2-7 days (for fungi). The growth culture was standardized using sterile normal saline to obtain a density of 10\(^6\) cfu/ml for bacteria. A sporulated test fungal spores was harvested with 0.05%Tween80 in sterile Normal saline and standardized to 10\(^5\) spores/ml.

**Preparation of Culture Media**
The prescribed quantities of the dehydrated bacteriological culture media was weighed and hydrated with distilled water according to the manufacturers specification. Where necessary, gentle heat was applied to aid dissolution and the resultant suspensions were dispensed into clean bottles and sterilized at 121°C for 15 minutes in an Adelphi bench autoclave.

**Antimicrobial Profile (susceptibility test)**
The antibacterial screening was carried out using agar diffusion method.\textsuperscript{[13]} The extract was weighed and dissolved in DMSO to obtain the initial concentrations (40mg/ml) of the different extracts. Overnight culture of the various bacteria in blood agar and the fungi in sabouraud dextrose agar slant media were sterilized to produce inoculums size of 10\(^6\)cfu/ml. The medium was seeded with 0.1 ml of standard inoculums of the micro-
organism (Mc-Forland 0.5). The inoculums were sprayed evenly by the use of sterile swab over the surface of the medium, the seeded plates were allowed to dry at 37°C and 27°C for the bacteria and fungi respectively for 30 mins inside incubator. A standard cork borer of diameter 6mm was used to cut a well at the centre of each seeded medium used and 0.1ml of the solution of the extracts was then introduced into each hole on the surface of the medium of each bacteria. In one medium, 0.1ml of DMSO was introduced to serve as negative control and in another, Spafloxacin and Fluconazole (10 µg ml-1) to serve as positive control for the bacteria and fungi respectively. The medium was incubated at 37°C for 24 hours (for bacteria) and 27°C for 2-7 days (for fungi) after which the plates were observed for zones of inhibition. The zones of inhibition were measured with a transparent ruler and the result recorded.

Determination of Minimum Inhibitory Concentration

This was done using broth dilution method. In this method, 10ml nutrient broth (prepared according to manufacturers specifications) was dispensed into test tubes and sterilized at 121°C for 10 minutes and allowed to cool. Mc-Forland’s turbidity standard scale number 0.5 was prepared to give a turbid solution. Normal saline was inoculated with each of the test micro-organisms and incubated at 37°C for 6 hours to make a turbid suspension of the micro-organisms. After incubation, dilution of the micro-organism in DMSO was done until the turbidity (1.5x10⁶ cfu/ml) matched that of the Mc-Forland scale by visual comparison. Two fold serial dilution of the extract in the broth was done to obtain the following concentrations; 20mg/ml, 10mg/ml, 2.5mg/ml, 1.25mg/ml and 0.625mg/ml. From the suspension of the micro-organism in DMSO, 0.1ml was inoculated into the different concentrations of the extract in the nutrient broth. The broths were incubated at 37°C for 24hrs (for bacteria) and 27°C for 2-7 days (for the fungi) after which the test tubes were observed for turbidity. The lowest concentration of the extract in the broth which shows no turbidity represents the MIC. The results after 24 hour were recorded.

Determination of Minimum Bactericidal Concentration (MBC)

Blood agar was prepared according to manufacturer’s instruction, sterilized at 121°C for 15 minutes. It was poured into sterile petri-dishes. The plates were allowed to cool and solidify. The contents of the MIC test tubes in the serial dilution were then sub-cultured on to the prepared plates and the plates were then incubated at 37°C for 24 hours (for bacteria) and 27°C for 2-7 days (for the fungi) after which the plates were observed for growth. The plate without growth represents the minimum bactericidal concentration. After 24 hours the results were recorded.

Results:

The leaves of L. kerstingii contained more methanol soluble phytochemicals (32.44%) followed by petroleum ether (30.2%). The yield of the chloroform and ethyl acetate fractions were found to be 10.05 and 8.5% respectively (table 1).

The crude methanolic extract and chloroform fraction were found to contain flavonoids, tannins, steroids and triterpenes. The ethyl acetate fraction of the leaves of L. kerstingii was found to contain only flavonoids and tannins. While the petroleum ether extract contains only steroids and triterpenes (table 2).

The petroleum ether, the crude methanol extract and all the other two fractions were inactive against C. ulcerane, P. aeruginosa, C. albicans and A. flavus. The crude methanol and the petroleum ether extract were also inactive against S. typhi. All the extracts were active against S. aureus, S. faecalis, B. subtilis, MRSA, E. coli, K. pneumonia, S. dysentariae and the fungi C. tropicalis. The chloroform fraction and the ethyl acetate fraction were also active against S. typhi (Table 3). The zone of inhibition of the crude methanol extract ranged from 20.10mm (E. coli) to 25.12mm (S. dysentariae), that of petroleum ether ranged from 17.00mm (E. coli and C. tropicalis) to 21.03mm (S. aureus). The chloroform fraction showed high activity when compared to the ethyl acetate fraction with zone of
inhibition ranging from 25.32mm (S. typhi) to 34.02mm (B. subtilis). While that of ethyl acetate ranged from 22.28mm (S. typhi) to 27.20mm (B. subtilis, K. pneumonia and S. dysentariae) (table 3).

The MIC of the crude methanol and ethyl acetate fractions were 5mg/ml respectively. That of the chloroform extract was found to be 2.5mg/ml for S. faecalis, B. subtilis, K. pneumonia, S. typhi and S. dysentariae and 5mg/ml for S. aureus, MRSA, E. coli and C. tropicalis respectively while the MIC of the petroleum ether extract was 5mg/ml for S. aureus, B. subtilis and K. pneumonia and 10mg/ml for S. faecalis, MRSA, E. coli, S. dysentariae and C. tropicalis respectively as shown in table 4.

The MBC of the petroleum ether and the crude methanol extracts were above 40mg/ml for all the organisms except for B. subtilis whose MBC was 40mg/ml for the methanol extract. The chloroform extract showed MBC/MFC for all tested organism except for B. subtilis whose MBC was 20mg/ml. The ethyl acetate showed MBC of 40mg/ml for S. aureus, B. subtilis, E. coli and K. pneumonia and MFC of above 40mg/ml for C. tropicalis (table 5).

**Table 1 : % yield of the different extracts obtained from the extraction of the leaves of Lannea kerstingii.**

<table>
<thead>
<tr>
<th>Fraction</th>
<th>Colour</th>
<th>Weight</th>
<th>% yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petroleum ether extract</td>
<td>Dark green</td>
<td>30.02g</td>
<td>30.2%</td>
</tr>
<tr>
<td>Crude methanol extract</td>
<td>Dark green</td>
<td>32.44g</td>
<td>32.44%</td>
</tr>
<tr>
<td>Chloroform fraction</td>
<td>Light green</td>
<td>2.01g</td>
<td>10.05%</td>
</tr>
<tr>
<td>Ethyl acetate fraction</td>
<td>Light green</td>
<td>1.74g</td>
<td>8.5%</td>
</tr>
</tbody>
</table>

**Table 2 : Phytochemical constituents present in the different extracts of the leaves of Lannea kerstingii.**

<table>
<thead>
<tr>
<th>Constituents</th>
<th>Petroleum ether extract</th>
<th>Crude methanol extract</th>
<th>Chloroform fraction</th>
<th>Ethyl acetate fraction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthraquinones</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Flavonoids</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Tannins</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Alkaloids</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Coumarins</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Saponins</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Steroids and triterpenes</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Cardiac Glycoside</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Key: - = not present, + = present**

**Table 3 : Zone of inhibition of crude methanol extract, chloroform and ethyl acetate fraction of the leaves of L. kerstingii.**

<table>
<thead>
<tr>
<th>TEST ORGANISM</th>
<th>PETROLEUM ether fraction</th>
<th>CRUD CH OH extract</th>
<th>CHCl fraction</th>
<th>ETHYL acetate fraction</th>
<th>Sparflo-zin</th>
<th>Flucona-zole</th>
</tr>
</thead>
<tbody>
<tr>
<td>S. aureus NCTC6571</td>
<td>21.03</td>
<td>20.10</td>
<td>27.30</td>
<td>25.10</td>
<td>27.00</td>
<td></td>
</tr>
<tr>
<td>S. faecalis</td>
<td>19.10</td>
<td>21.23</td>
<td>30.10</td>
<td>24.10</td>
<td>32.02</td>
<td></td>
</tr>
<tr>
<td>B. subtilis</td>
<td>20.10</td>
<td>25.24</td>
<td>34.02</td>
<td>27.20</td>
<td>47.00</td>
<td></td>
</tr>
<tr>
<td>C. ulcerane</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>32.11</td>
<td></td>
</tr>
<tr>
<td>Methicillin-resistant S. aureus (MRSA)</td>
<td>19.02</td>
<td>22.06</td>
<td>28.41</td>
<td>24.21</td>
<td>37.03</td>
<td></td>
</tr>
<tr>
<td>E. coli NCTC10418</td>
<td>17.00</td>
<td>20.10</td>
<td>27.24</td>
<td>26.22</td>
<td>37.10</td>
<td></td>
</tr>
<tr>
<td>K. pneumoniae ATCC 10031</td>
<td>20.42</td>
<td>24.10</td>
<td>31.34</td>
<td>27.20</td>
<td>47.02</td>
<td></td>
</tr>
<tr>
<td>S. typhi ATCC 9184</td>
<td>0.00</td>
<td>0.00</td>
<td>25.32</td>
<td>22.28</td>
<td>32.23</td>
<td></td>
</tr>
<tr>
<td>S. dysentariae</td>
<td>19.30</td>
<td>25.12</td>
<td>32.16</td>
<td>27.20</td>
<td>39.33</td>
<td></td>
</tr>
<tr>
<td>P. aeruginosa NCTC6750</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>29.22</td>
<td></td>
</tr>
<tr>
<td>C. albicans</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>32.00</td>
<td></td>
</tr>
<tr>
<td>C. tropicalis</td>
<td>17.00</td>
<td>22.03</td>
<td>27.00</td>
<td>24.10</td>
<td>29.21</td>
<td></td>
</tr>
<tr>
<td>A. flavus</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>34.01</td>
<td></td>
</tr>
</tbody>
</table>
### Table 4: Minimum Inhibitory Concentration of petroleum ether and crude methanol extract, chloroform and ethyl acetate fractions of the leaves of *L. kerstingii* against Test Organisms

<table>
<thead>
<tr>
<th>TEST ORGANISM</th>
<th>Petroleum ether extract</th>
<th>Crude methanol extract</th>
<th>Chloroform fraction</th>
<th>Ethyl acetate fraction</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>S. aureus</em> NCTC6571</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td><em>S. faecalis</em></td>
<td>10</td>
<td>5</td>
<td>2.5</td>
<td>5</td>
</tr>
<tr>
<td><em>B. subtilis</em></td>
<td>5</td>
<td>5</td>
<td>2.5</td>
<td>5</td>
</tr>
<tr>
<td>MRSA</td>
<td>10</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td><em>E. coli</em> NCTC10418</td>
<td>10</td>
<td>5</td>
<td>2.5</td>
<td>5</td>
</tr>
<tr>
<td><em>K. pneumoniae</em> ATCC 10031</td>
<td>5</td>
<td>5</td>
<td>2.5</td>
<td>5</td>
</tr>
<tr>
<td><em>S. typhi</em> ATCC 9184</td>
<td>10</td>
<td>5</td>
<td>2.5</td>
<td>5</td>
</tr>
<tr>
<td><em>S. dysenteriae</em></td>
<td>10</td>
<td>5</td>
<td>2.5</td>
<td>5</td>
</tr>
<tr>
<td><em>C. tropicalis</em></td>
<td>10</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

### Table 5: Minimum Bactericidal / Fungicidal Concentration of petroleum ether and crude methanol extracts, chloroform and ethyl acetate fractions of the leaves of *L. kerstingii* against Test Organism

<table>
<thead>
<tr>
<th>TEST ORGANISM</th>
<th>Petroleum ether extract</th>
<th>Crude methanol extract</th>
<th>Chloroform fraction</th>
<th>Ethyl acetate fraction</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Staphylococcus aureus</em> NCTC6571</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td><em>Streptococci faecalis</em></td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td><em>Bacillus subtilis</em></td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>MRSA</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td><em>Escherichia coli</em> NCTC10418</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td><em>Klebsiella pneumoniae</em> ATCC 10031</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td><em>Salmonella typhi</em> ATCC 9184</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td><em>Shigella dysenteriae</em></td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td><em>C. tropicalis</em></td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
</tbody>
</table>

### Discussion:

Methanol was found to be a better extraction solvent than petroleum ether (table 1) which is with conformity with literature.\(^{16}\) Flavonoids have been shown to have anti-viral and antimicrobial activities.\(^{17,18}\) Tannins may exhibit antibiotic activity by complexing extracellular enzymes produced by the pathogens or by interference with the metabolism of the pathogen itself.\(^{19}\) Thus the antimicrobial activity of the leaves may be due to the presence of flavonoids and tannins (table 2).

The methanol and ethanol extract of the leaves of *L. kerstingii* have been reported to be active against *S. aureus, E. coli*, *P. vulgaris, S. typhi, S. lactis*, *Shigella sp.*.\(^{20}\) This is in line with the current study in which the methanol extract show activity against *S. aureus, E. coli* and *S. dysenteriae* but inactive against *S. typhi* (table 3). This difference may be due to age, physiological variations, environmental conditions, geographic variations, genetic factors and evolitional differences of the plant.\(^{21}\) or the presence of an antagonist in the extract.

Among the extracts, the petroleum ether fraction is the least active. Its activity is solely due to the presence of steroids and triterpenes present in the fraction (table 2). The chloroform fraction is the most active and its activity is be due to the presence of low molecular weight flavonoids, tannins, steroids and triterpenes (table 2). The results of this study corresponds with several investigation that flowering plants are potential source of antimicrobial substances.\(^{22,23}\)

The low MIC of these extracts (table 3) especially the chloroform fraction showed the extract’s activity against both Gram positive and Gram negative bacteria which are associated with different type of infections including urinary tract infections (*S. aureus*), and typhoid fever (*S. typhi*). *S. aureus* is also responsible for a wide variety of
diseases, including pneumonia, skin and soft tissue infections, and diabetic foot infections.\(^{[24]}\) Similarly, *P. aeruginosa* is a common pathogen associated with burn wound infections, keratitis, and respiratory tract infections.\(^{[21]}\) The extract also showed activity against *E. coli* (MIC 5mg/ml) which is the commonest cause of urinary tract infection and accounts for approximately 90% of first urinary tract infection in young women.\(^{[15]}\) This indicates the usefulness of this plant in the treatment of urinary tract infection, respiratory tract infections, diabetic foot infections due to its activity against the organisms causing these infections. This result gives scientific base and credence for the claims of the therapeutic capabilities and folkloric usage of the leaves of *Lannea kerstingii* for the treatment of various ailments.

**Conclusion:**

The leaves of *Lannea kerstingii* contains phytochemicals which possess antimicrobial activity. This study therefore supports the traditional use of *Lannea kerstingii* for the treatment of various infectious diseases in Nigeria and different regions of the world, and may serve as a good source of novel antibiotics.

**Acknowledgment:**

The authors are grateful to the Department of Biological Sciences ABU Zaria for Identification of the plant, the Department of Pharmacological Microbiology, ABU Zaria for provision of micro-organisms, and to Mr. Abdullahi Makailu Sabo of the Nigerian Institute of Leather and Science Technology (NILEST) Zaria, for his assistance with the antimicrobial screening.

**References :**

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LOCOMOTOR TREADMILL TRAINING PROGRAM USING DRIVEN GAIT ORTHOSIS VERSUS MANUAL TREADMILL THERAPY ON MOTOR OUTPUT IN SPASTIC DIPLEGIC CEREBRAL PALSY CHILDREN

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Abstract:
Purpose: This study intended to understand and compare the effect of loco-motor treadmill training program using robot-assisted gait therapy (Driven gait-orthosis DGO) and manual treadmill therapy on motor function in children with spastic diplegic cerebral palsy on their gross motor skills related to walking speed, ambulation and endurance.

Subjects and Methods: Twelve spastic diplegic cerebral palsy children with the age under 5 years were participated in different ambulation training 3 times per week for 30 - 40 minutes sessions consisting of 2 different treadmill walking programs, for 10 weeks, and were tested pre and post intervention. The outcome measures included were; a timed 10-m walk test, ground walking speed, walking distance, and balance which were measured before and after treatment.

Results & Conclusion: The results of this study suggests preliminary findings that children with CP under the age of 5 years can benefit their gross motor function, gait variables after intensive ambulation training using Driven gait orthosis (DGO).

Keywords: Spastic Diplegic Cerebral Palsy, Driven Gait Orthosis, Motor Function.

Introduction:
Cerebral palsy (CP) is the most common physical disability occurs in childhood. The recent data show that the incidence of CP is 3.6 on every 1000 live births. As there is no cure for the CP, the motor disability continues throughout the life and interacts with normal developmental and aging processes which alter its presentation over time. In spastic CP, spasticity develops because of the damage to the descending motor nerve tracts and there will be resistance and limitation of normal muscle movements.

Thereby it leads to muscle contractures which limit joint movement and hence, develop abnormal pattern of motor control. Until recently, treatment for spasticity of muscles in children with cerebral palsy has consisted of physical therapy, bracing and surgery to lengthen and release tight tendons of contracted muscles and correct muscle contractures.

Most of the children with CP have ambulatory difficulties. Because normal walking is essential for orthopedic and cardiopulmonary development, and for normal activities of daily living, the achievement of independent, effective, and safe gait is therefore the most important goal of rehabilitation in children with CP. Their walking energy expenditure is increased up to 3 times that of typically developing children, particularly for children with poorer locomotor function, classified as level III (reliant on a hand-held mobility device for ambulation) or IV (can walk only short distances with a body support walker) by the GMFCS (Appendix 1). Improving walking function for children with moderate to severe walking difficulty is particularly...
important because it has the potential to increase their mobility and positively influence their societal participation at home, at school, and in the wider community. The benefits of ambulation are many whether with or without assistance like; muscle activity and weight bearing during walking increase bone mineral density (Wilmshurst, Ward, Adams, Langton, & Mughal, 1996) and can decrease the risk of hip subluxation or dislocation (Metaxiotis, Accles, Siebel, & Doederlein, 2000). Other benefits gained from ambulation are improved endurance of cardiopulmonary system and control of obesity (Chien, DeMuth, Knutson, & Fowler, 2006).

With a growing body of research evaluating the efficacy of training on treadmill for adults with neurologic disorders, most notably after injury to spinal cord, clinicians and researchers in pediatric CP field have begun to turn their attention to the potential benefits of treadmill training for benefitting walking in CP children. This interest is on the basis of the principle that task-specific and repetitive practice is needed to develop and improve a motor skill such as walking. Using a mechanical treadmill, with or without supporting the body weight, may improve gait in children with CP because it gives an opportunity to intensively and repetitively train the entire cycle of gait and facilitate an improved gait pattern during walking. Preliminary work suggests that body weight supported treadmill training is feasible in CP children and may improve their gait variables and general gross motor skills.

Locomotor treadmill training (LTT) is relatively new concept that is used to train the CP children on ambulation in a more efficient manner. LTT with or without body weight support, is one method that is followed in the rehabilitation of CP children. The central nervous system (CNS), through mechanisms of brain plasticity, has the capacity to learn and adapt. The goal of therapeutic exercise for the re education of muscles and facilitation is to get back the body positions and movements voluntary control after injury or disease has affected the motor control mechanism. Motor control may be affected by damage to either or both the afferent and efferent neural pathways, as well as damage to central control centers in the motor and premotor cortex. Although, exact mechanisms are not clear, the nervous system is continually adapting to environmental stimuli. This reorganization is termed as neural plasticity. Brain plasticity may be intensified by exercise, including movement activities, and the effect of motor learning depends on the intensity and regularity of performing these.

Latest developments in clinical neuroscience give lot of hope that the institution of effective functional therapies on the basis of on enhanced activity can improve the level of functioning in children with CP. Recent concepts of motor learning assume that repetitive, task-specific training, enabled by a driven gait orthosis, may be a cost-effective means allowing for an improvement in walking ability. One of the latest solutions in this area is the Lokomat (Hocoma AG, Volketswil, Switzerland), which was designed for adults and shown to facilitate significant improvements in individuals with injury to spinal cord. A paediatric device for children age of 4 years and over has been available since 2006; however, there are only a few studies assessing body-weight-supported treadmill therapy applied to paediatric patients. Robot-assisted walking training can increase the duration of training and the intensity for the patients while the therapist's physical strain also can be minimized.

**Aim of the work:**
The purpose of the current study was to compare the effect of an intensive, loco-motor treadmill training program using robot-assisted gait therapy (Driven gait-orthosis DGO) and manual treadmill therapy on gross motor skills related to ambulation, walking speed and balance in children with diplegic cerebral palsy (CP) under the age of 5 years.

**Subjects and Methods:**
**Subjects:**
Twelve subjects (7 male and 5 female) with neurological walking disorders due to spastic diplegic cerebral palsy participated in the study. The participants had an average weight of 28 kg (SD±4.3), an average height of 89 cm
(SD±6.7), and their age ranged from 3 to 5 years, with an average age of 4.2 years (SD±0.7). All children were being treated as either inpatients or outpatients in pediatric clinics. The subjects were randomly divided into two equal groups, control group and study group. The control group received manual treadmill therapy and the study group received intensive, loco-motor treadmill training program using robot-assisted gait therapy (Driven gait-orthosis DGO), and each comprised of six patients. Both groups used computerized visual feedback and verbal instructions of a physical therapist. After explaining the need of the study to the subject’s parties, informed written consent for this study was obtained. The study was approved by the Institutional Review Board.

The inclusion criteria for recruiting the subjects were; All children with cerebral palsy had a pediatrician’s diagnosis of spastic diplegia, the subjects were recruited with at least minimal voluntary control of their lower-extremity muscles for the ability to respond and to adapt their walking, the treating physical therapists judge the ability of the subjects to voluntarily control their lower extremities (ie, at least minimal movement in hip and knee joints was observed upon instruction), the subjects were having mild spasticity, which has been confirmed clinically according to Ashworth’s scale, the subjects were having Level III or IV of Gross Motor Function Classification System (GMFCS), subjects were having sufficient cognition should be demonstrated to understand the requirements of the study and all subjects have never received treadmill gait training at any time before the study. The exclusion criteria were: children treated with botulinum toxin during the last 6 months; children treated surgically within a 1-year period before the date of the examination; anatomical leg length discrepancy larger than 2 cm (due to the Lokomat system limitations); fixed contractures; bone and joint deformities; bone-articular instability (joint dislocation); baclofen therapy using an implanted infusion pump; inhibiting casts during the last 6 months; significant amblyopia and hearing loss; contra-indications for training on a treadmill; any significant endurance impairments due to cardiovascular limitation based on patient’s health history and lack of patient cooperation.

Materials:
For the experimental group we have instituted the Lokomat Driven gait-orthosis LDGO (Lokomat® Pro Version 4, by Hocoma AG, Volketswil, Switzerland). The Lokomat system consists of; a treadmill, a body weight support system, a harness, a driven gait orthosis. The Lokomat DGO is a bilateral robotic gait orthosis that is used in conjunction with a body weight–support system to control a patient’s leg movements in the sagittal plane. The hip and knee joints of the DGO are actuated by linear drives, which are integrated into an exoskeletal structure with force sensors in the hip and knee linear drives. The legs of the patient are moved with predefined hip and knee joint trajectories. A passive foot lifter induces an ankle dorsiflexion during the swing phase. The legs of the patient are moved with highly repeatable predefined hip and knee joint trajectories on the basis of an impedance control strategy. Knee and hip joint torques of the subject are determined from force sensors integrated in the drives of the DGO.

For the control group it was trained on a Manual treadmill therapy consists of; a treadmill, a Biodex unweighing system with hydraulic lift and a harness. The visual feedback is presented and displayed as line graphs on the patient monitor and on the monitor for the physical therapist.

For the evaluation of the outcome we have used the following tools; Walking sheet: 10 meters long, divided at 1-cm intervals, Recording and displaying system consists of; Video set, camera and tapes, Color TV and Stop watch, Tape measure, The Bruininks-Oseretsky Test of Motor Proficiency Subset 2 for Balance (Form 1), and 10 meter Walk Test (time in sec or msec).

Among the timed walking tests, the simplest to administer is the ten-meter walk test (10mWT). It is simply a documented measure of the time required for the patient to traverse ten meters at his self-selected walking speed. Properly administered, the test is performed with a flying start and finish. Specifically, the patient should be allowed
several meters of ambulation immediately before and after the ten-meter walkway to ensure that there are no periods of acceleration or deceleration within the timed event itself. Additionally, clinicians should walk behind the patient rather than at his or her side or in front of him or her to ensure that they are not pacing the patient at a speed other than the patient’s true, self-selected walking speed.

Methods of Evaluation:

Age, Sex, height, weight and body mass index (BMI) were done according to standardized methods. Gait evaluation was performed as follows; the walking sheet was positioned on the floor of the gait evaluation area and fastened on both sides. The children were asked to walk as normally as they used to, from the start to the end of the walkway. This was repeated three successive times. Then, the subjects were videotaped along the ten-meter long of the sheet. The videotape was then played back on the TV for the measurement of the temporal and distance gait parameters, as follows:

- Stride length: The distance between two successive placements of the same foot.
- Cadence: The number of steps taken per minute.
- Velocity: The distance covered in a minute. (Whittle, 1993)

The Balance evaluation was done using the Bruininks-Oseretsky Test of Motor Proficiency Subset 2 for balance. Each test was repeated two times, after which the final score was calculated. All evaluation procedures were conducted by the same investigator for each patient before and after the suggested period of treatment.

The following steps were taken before starting the treatment; upon arriving to the treatment area, all the subjects were given an overview of the treatment procedure and were also instructed on how to safely step onto and off the treadmill. The subjects of the control group were fitted with the harness with support across the buttocks, around the thigh and around the rib cage, while allowing free movement of the limbs. The harness suspended from an overhead support and the support allowed free movement of the lower extremities.

The subjects of the study group were fitted with a bilateral robotic orthosis that is used in conjunction with a body-weight support system to control the patient’s leg movements in the sagittal plane. The DGO’s hip and knee joints are actuated by linear drives, which are integrated in an exoskeletal structure. A passive foot lifter induces an ankle dorsiflexion during the swing phase. The legs of the patient are moved with highly repeatable predefined hip and knee joint trajectories on the basis of an impedance control strategy. Knee and hip joint torques of the patient are determined from force sensors integrated in the drives of the DGO.

The treating physical therapists judged the ability of the subjects to voluntarily control their lower extremities (ie, at least minimal movement in hip and knee joints was observed upon instruction). The subjects then walked on the treadmill to become familiar with treadmill and determine their self-selected walking speed (Their preferred speed), then the treadmill was stopped, and appropriate amount of unweighting of each subject was adjusted. The treadmill speed was set for each subject individually according to his/her preferred speed. The average speed was 0.55 m/s (SD±0.08 m/s) with the lowest possible body-weight support (where knee buckling was still prevented for passively behaving subjects). The impedance for the DGO control program was set to maximum (ie, the “guidance force” was set at 100%). Then the subjects were weighed on the previously calibrated Tefal Electronic Device (weight scale), this weight was used to calculate the support needed for each subject. The investigator was positioned next to the treadmill to guard the subjects from falling. Treatment for both groups continued for ten successive weeks, thrice a week. Each session lasted about 30 - 40 minutes.

Results:

Twelve subjects (n=12) were participated in this study and the statistical comparison between values obtained before and after training were done using “t tests”. Results are presented as means ± standard deviation (SD) and the
differences were considered significant by keeping the confidence interval at 5% (p<0.05).

As shown in table 1, the mean value of the stride length in study group before treatment was 59.4 cms, which increased after the suggested period of treatment to 66.0 cms. The improvement was 11 %, which revealed a highly significant difference (t =7.92, p < 0.001) and the mean value of the stride length in control group before treatment was 59.0 cms, which increased after the suggested period of treatment to 61.4 Cm. The improvement was 4 %, which revealed a non significant difference (t = 2.714, p< 0.025).

As shown in Table 2, the mean values of cadence in the study group before and after the suggested period of treatment were 74.16 ± 7.386 and 80.92 ± 6.369( in steps/min ), respectively. The mean difference was 6.76, which was statistically highly significant (p < 0.001) whereas the mean value of cadence in the control group increased from 74.96 ± 7.295(in steps/min) to 79.57 ± 8.135 (in steps/min) after treatment, which indicated a non-significant improvement (p < 0.815).

As it is shown in the table 3, the mean value of velocity in the study group before treatment was 36.03 ± 4.495 cms/sec which was increased to 41.8 ± 3.705 cms after 10 weeks of treatment. The mean difference was 5.75, which represented a highly significant difference (p < 0.001). In the control group, the mean value of velocity has increased from 38.45 ± 4.272 cms to 39.67 ± 3.637 cms after application of the traditional physical therapy program, with a mean difference of 1.22, which was shown as statistically not significant (p<0.032).

From the table 4, it can be shown that in the study group, the mean values of the grades of stability before and after treatment were 14.6 ± 0.966 and 16.4 ± 2.75 (grades), respectively where the mean difference was .1.8 grades, which was statistically highly significant (p< 0.001). Meanwhile, the mean values of these grades in the control group before and after treatment were 15.3 ± 1.494 and 16.6 ± 1.577(grades) respectively, showing a mean difference of 1.3 (grades) which was also statistically significant (p < 0.005).

### APPENDIX

1. The Bruininks-Oseretsky Test of Motor Proficiency Subset 2 for balance. (Form 1)

<table>
<thead>
<tr>
<th>Action</th>
<th>Duration</th>
<th>Point Score</th>
<th>Total Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Trial 1</td>
<td>Trial 2</td>
</tr>
<tr>
<td>Standing on preferred leg on floor</td>
<td>10 seconds maximum per trial</td>
<td>() seconds</td>
<td>() seconds</td>
</tr>
<tr>
<td></td>
<td></td>
<td>01234</td>
<td>01234</td>
</tr>
<tr>
<td>Standing on preferred leg on balance beam</td>
<td>10 seconds maximum per trial</td>
<td>() seconds</td>
<td>() seconds</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0123456</td>
<td>0123456</td>
</tr>
<tr>
<td>Standing on preferred leg on balance beam - eyes closed</td>
<td>10 seconds maximum per trial</td>
<td>() seconds</td>
<td>() seconds</td>
</tr>
<tr>
<td></td>
<td></td>
<td>01234567</td>
<td>01234567</td>
</tr>
<tr>
<td>Walking forward on walking line</td>
<td>6 seconds maximum per trial</td>
<td>() steps</td>
<td>() steps</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0123</td>
<td>0123</td>
</tr>
<tr>
<td>Walking forward on balance beam.</td>
<td>6 seconds maximum per trial</td>
<td>() steps</td>
<td>() steps</td>
</tr>
<tr>
<td></td>
<td></td>
<td>01234</td>
<td>0123</td>
</tr>
<tr>
<td>Walking forward heel-to-toe on walking line</td>
<td>6 seconds maximum per trial</td>
<td>() steps</td>
<td>() steps</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0123</td>
<td>0123</td>
</tr>
<tr>
<td>Walking forward heel-to-toe on balance beam.</td>
<td>6 seconds maximum per trial</td>
<td>() steps</td>
<td>() steps</td>
</tr>
<tr>
<td></td>
<td></td>
<td>01234</td>
<td>01234</td>
</tr>
<tr>
<td>Stepping over response speed Stick on balance beam</td>
<td>10 seconds maximum per trial</td>
<td>() steps</td>
<td>() steps</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0123</td>
<td>01</td>
</tr>
</tbody>
</table>

Adopted from Bruininks (1987)
Keywords: Spastic Diplegic Cerebral Palsy, Driven Gait Orthosis, Motor Function. - Mohamed Faisal Chevidikunnan

Table 1: Shows mean values of stride length (in cms) in both control and study group after treatment

<table>
<thead>
<tr>
<th>Comparison</th>
<th>Study</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>After</td>
</tr>
<tr>
<td>Mean</td>
<td>59.4</td>
<td>66.0</td>
</tr>
<tr>
<td>SD</td>
<td>5.92</td>
<td>5.436</td>
</tr>
<tr>
<td>MD</td>
<td>6.6</td>
<td>2.4</td>
</tr>
<tr>
<td>t</td>
<td>&lt; 0.001</td>
<td>2.714</td>
</tr>
<tr>
<td>p</td>
<td>&lt; 0.001</td>
<td>0.025</td>
</tr>
</tbody>
</table>

Table 2: Shows mean values of cadence (in steps/min) in both study and control groups before and after treatment.

<table>
<thead>
<tr>
<th>Comparison</th>
<th>Study</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td>Mean</td>
<td>74.16</td>
<td>80.92</td>
</tr>
<tr>
<td>SD</td>
<td>7.386</td>
<td>6.369</td>
</tr>
<tr>
<td>MD</td>
<td>6.76</td>
<td>0.39</td>
</tr>
<tr>
<td>t</td>
<td>6.002</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>p</td>
<td>&lt; 0.001</td>
<td>0.815</td>
</tr>
</tbody>
</table>

Table 3: Shows mean values of gait velocity (in cms/sec) in both study and control groups before and after treatment.

<table>
<thead>
<tr>
<th>Comparison</th>
<th>Study</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td>Mean</td>
<td>36.05</td>
<td>41.8</td>
</tr>
<tr>
<td>SD</td>
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<td>3.705</td>
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<tr>
<td>MD</td>
<td>5.75</td>
<td>1.22</td>
</tr>
<tr>
<td>t</td>
<td>8.4</td>
<td>2.542</td>
</tr>
<tr>
<td>p</td>
<td>&lt; 0.001</td>
<td>&lt; 0.032</td>
</tr>
</tbody>
</table>

Table 4: Shows mean values of Stability (in grades) in both study and control groups before and after treatment.

<table>
<thead>
<tr>
<th>Comparison</th>
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<th>Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td>Mean</td>
<td>14.6</td>
<td>16.4</td>
</tr>
<tr>
<td>SD</td>
<td>9.66</td>
<td>2.75</td>
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<tr>
<td>MD</td>
<td>1.8</td>
<td>1.3</td>
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<tr>
<td>t</td>
<td>1.765</td>
<td>3.545</td>
</tr>
<tr>
<td>p</td>
<td>&lt; 0.001</td>
<td>&lt; 0.005</td>
</tr>
</tbody>
</table>

Discussion:
The purpose of the current study was to compare the effect of an intensive, loco-motor treadmill training program using robot-assisted gait therapy (Driven gait orthosis DGO) and manual treadmill therapy on gross motor skills related to ambulation, walking speed and balance in children with diplegic cerebral palsy (CP) under the age of 5 years.

Walking ability, which is extremely important for the quality of life and participation in social and economic life, can be adversely affected by neurological disorders. Rehabilitation of patients with such disorders should include gait training, due to evidence that the desired function or movement has to be developed in a task-specific training programme. Recently, gait rehabilitation methods in patients with neurological impairments have relied on technological devices, which drive the patient’s gait in a body-weight support condition and emphasize the beneficial role of repetitive practice. The rationale for these approaches originates from animal studies, which have shown that repetition of gait movements may enhance spinal and supraspinal locomotor circuits.

In this study we examined the changes in gait parameters associated with DGO and supported body weight treadmill training. We utilized gait evaluation parameters, including, stride length, cadence, velocity and the Bruininks-Oseretksy Test Motor Proficiency Subtest 2 for balance. The results at the end of the treatment period indicated significant improvement in cadence, stride length, gait velocity and balance in the study group who received a bilateral robotic orthosis that is used in conjunction with a body-weight support system whereas in the control group only the balance has shown a significant improvement. Such significant differences reflect the great influence of the bilateral robotic orthosis that is used along with body-weight support system training in treatment of diplegic CP.

The use of DGO in patients with CNS disorders has many benefits. These include: providing a safe environment to practice walking, making repetitive training more feasible, increasing safety of standing and ambulation training, and decreasing the work reducing the number of therapists. However, the limitations and controversial findings in published research suggest the need for further studies. Unfortunately we could not find much of published articles on the effect of DGO in CP children to have a comparison of the current study; meanwhile we could find many articles on the effect of body weight...
supported treadmill training (BWSTT) in different neurological conditions. In our study it was found that both these treatment techniques are found to be effective but DGO had a slightly better edge on the parameters tested in CP children.

The study by Chrysagis N et al, found in their study on effect of treadmill training on CP children that, children receiving treadmill training had higher mean posttest GMFM and walking speed scores compared with the control group receiving conventional physiotherapy. Therefore, patients with CP exposed to treadmill training may improve their motor function and gait speed to a greater extent, without an adverse effect on spasticity, compared with their counterparts after conventional physiotherapy. This supports the theory of motor learning through task-specific repetitive movements. According to this approach, training should be customized around a treatment goal demanding the participant’s active motivation. Another study by Richards et al.(1997) who have stated that, pattern of walking seen in children with CP is very similar to the leg muscle activity described in stepping newborns. They assumed that in children with cerebral palsy, the locomotor pattern cannot mature because of impaired supraspinal influence, and the impact of BWSTT is shown to have a greater effect on neuronal connections in spinal cord.

Schindl et al.(2000), reported that stretching the hip flexors in terminal stance stimulates the primary nerve ending of the muscle spindles, thereby activating the muscles and initiating the leg to come forward. In addition, the increased tension placed on the triceps surae muscle by loading the limb in mid-stance during BWSTT, has also found to facilitate muscle activation. Hesse et al. (1999), stated that BWSTT is beneficial as a treatment method because the movement of the lower extremities into extension afforded by the treadmill assists in stimulating a stepping response not otherwise able to be elicited. While upright and safe position of the patient not only functional for the patient, but it also allows the therapist to be more effective.

Even though therapists are using BWSTT because of its clinical effectiveness, evidence supporting the clinical significance of the treatment method still rather limited. Some limitations do not allow for generalizations of the present findings without adequate caution. An additional secondary outcome variables like muscle strength and energy expenditure, were not assessed in the current study and in addition, the effect of the training program on the participants’ psychologic parameters, like quality-of life, was not examined.

Conclusion:
From the results of the present study we can conclude that, the study group CP children who were receiving DGO were showing slightly better improvement in all the gait variables tested except the balance as compared with the BWSTT group.

Acknowledgements:
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**A STUDY TO ASSESS THE LEVEL OF ATTITUDE TOWARDS EUTHANASIA AMONG HEALTH PERSONNEL**

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**Abstract:**
Most people would probably want to live to a ripe old age, and then die painlessly in their sleep. Unfortunately, this is not the reality most people face. Some people will die after a long struggle with a painful disease. Euthanasia has become a complex global issue for the 21st century, with different cultures wrestling with variety of ethical, religious and legal factors involved in helping someone to die legally. The role of health personnel in euthanasia would ultimately cause more harm than good. Euthanasia is fundamentally incompatible with the physician’s role as healer, would be difficult or impossible to control, and would pose serious societal risks.

**Aim:** It aims at contributing to the current literature in regard to euthanasia through shedding the light onto the attitude towards euthanasia among health personnel.

**Material and Methods:** An exploratory descriptive design was used to conduct this study non probability sampling technique was employed, the sample consisted of 70 Health Personnel including Doctor & Nurses who are working in Government and Private health institutions at Puducherry. After obtaining informed consent data was collected using with self structured questionnaire for demographic variables of the samples and the Euthanasia attitude scale (EAS) developed by Holloway, Hay slip, Murdock et al 1995, was utilized to measure the attitude of a person has towards end of life decisions.

**Results:** The study findings revealed that out of 70 health personnel 42 (60%) had Positive attitude and 28 (40%) had Negative attitude towards euthanasia.

**Conclusion:** Health personnel had positive attitude towards euthanasia in certain circumstances for terminally ill clients with unbearable pain.

**Keywords:** Euthanasia, Involuntary, Mercy Killing, Attitudes, Health Professionals

**Introduction:**
The preservation of human life is the ultimate value, the pillar of ethics and the foundation of all morality. This held true in most cultures and societies throughout history. Life is sacred, valuable to be cherished and perished. Most people would probably want to live to a ripe old age, and then die painlessly in their sleep. Unfortunately, this is not the reality most people face. Some people will die after a long struggle with a painful disease. Others will find that their body deteriorates to such a degree, that they wish they were dead. A person might argue that all available medical technology ought to be brought to bear in the preservation of life, but the pain and financial burdens that family members, patients or society might have to endure could be so great that although the person might want to go on living, it would be in the best interest of the patient, family or the society that the individual should choose to die. The known purposes of the medical profession are to help people survive, live longer in spite of chronic illness and get rid of pain. Advancement in medical care and the application of its technology have always helped in attaining this goal. Unfortunately among all long lived individuals, some die peacefully and some with...
painful, tortuous deaths. When life is without quality, when pain and discomfort rob life of its significance, some persons cry out for release through death - a good death through euthanasia (1,3).

The word euthanasia is linked to the Greek words for good (eu), and death (thanatos). Euthanasia is therefore associated with the idea of wanting to die free from suffering, or to have a good death (2). Euthanasia refers to the practice of intentionally ending a life to relieve pain and suffering. The term euthanasia was first used in medical context by Francis Bacon in the 17th century to refer to an easy, painless, happy death during which it was physicians' responsibility to alleviate the physical sufferings of the body (4). But Euthanasia is controversial, because it puts the plight of suffering, dying individuals against religious beliefs, legal tradition, and, in the case of physician assisted death, medical ethics. The role of health personnel in euthanasia would ultimately because more harm than good also it heightens the significance of its ethical prohibition rather. Euthanasia is fundamentally incompatible with the physician's role as healer, would be difficult or impossible to control, and would pose serious societal risks (2,4). Instead of engaging in euthanasia, physicians and nurses must aggressively respond to the needs of patients at the end of life. Patients should not be abandoned once it is determined that cure is impossible. Patients near the end of life must continue to receive emotional support, comfort care, adequate pain control, respect for patient autonomy, and good communication.

Need For The Study:
The controversy over euthanasia has sparked many views that it is the act of taking the life, for reasons of mercy of a person who is hopelessly ill, while other view it as morally outrageous. The attitude towards euthanasia is not a simple thing and there are many factors that influence it, these include, culture, religious beliefs, age and gender. Although euthanasia is illegal in many countries, it is legal in some countries such as the Netherlands, Belgium and the US state of Oregon. Some studies stated that such debate about legalizing euthanasia would cause a general weakening of public and social morality. Some views state that doctors are willing to perform voluntary euthanasia if it becomes legal in the country. It is thought that the majority of medical practitioners are in favor to change the law and allow euthanasia in certain circumstances (7).

According to British Social Attitude Survey in 1996, euthanasia was preferred for incurable conditions by 86% of population, for dying patients by 80% of population, for patients in coma by 58% of population and for patients with danger of death and not much pain by 57% of population (5). According to 2010 British Social Attitude Survey, 82% of the general public believed that doctor should be allowed to end the life of a patient with a painful incurable disease at the patient's request, which was supported by 71% of religious people and 92% of non-religious people (6). Recent reports from Netherlands and Belgium provide that there is a growing number and percentage of people who are dying by euthanasia. The reports from Netherlands stated that there were 2331 cases of euthanasia in 2008 up from 2010 cases in 2007 and 1923 cases in 2006. This represented an increase of 10% each year. The Belgium study examined 6202 death certificates in Flanders region and found that 118 were euthanasia deaths. A study that was published in the New England Journal of medicine indicated that 7.1% of all deaths in Netherlands in 2005 were related to terminal sedation which is often done to cause the death of the person and not to relieve intractable pain (7,10). In 1962, a high court in Nagoya, Japan, declared euthanasia legal under special circumstances and specified that it should be performed by a medical doctor. A 1990 survey of members of the Japan Medical Society revealed that 87% of its members would honor a patient's desire "to die with dignity." However, any euthanasia performed without patient consent is against the law.

In India, Passive euthanasia is legal since 7th March 2011. The supreme court of India legalized passive euthanasia by means of the withdrawal of life support to patients in a permanent vegetative state. The decision was made as part of the verdict in a case involving Aruna Shanbaug, who has been in a vegetative state for 37 yrs at King Edward...
Memorial Hospital. The high court rejected active euthanasia by means of lethal injection. In the absence of a law regulating euthanasia in India, the court stated that its decision becomes the law of the land until the Indian Parliament enacts suitable law. Active euthanasia including the administration of lethal compounds for the purpose of ending life, is still illegal in India and in most countries. Nurses take up a central position in care of terminally ill patients, where being dealt with euthanasia request is an ever present possibility. Based on their professional expertise and unique relationship with patient, nurses are participating as full members of the interdisciplinary expert team are in a key position to provide valuable care to patients receiving euthanasia.

Medical professional can make significant contribution to the quality of care by assisting and counseling patients and their families, in a professional manner, even in countries where euthanasia is not legal.

Review of literature
Gielen J, conducted a study on religion and nurses attitudes to euthanasia and physical assisted suicide, they searched pub med for articles published before August 2008 using combination of search terms, most identified studies showed a clear relationship between two, difference in attitudes were found to be influenced by religious or ideological affiliation, observance of religious practices, religious doctrine and personal importance attributed to religion or world view, nevertheless, a coherent comparative interpretation of the results of the identified studies was difficult, we concluded that no study has so far exhaustively investigated the relationship between religion or world view and attitudes toward euthanasia or physically assisted suicide and that further research is required.

Sneha Kamath et.al (2011) conducted a cross sectional study to assess the attitudes toward euthanasia among 213 doctors in a tertiary care hospital in South India. A self administered questionnaire was used, 69.3% respondents supported the concept of euthanasia and 66.2% were against to euthanasia. This study conclude that a majority of the doctors supported euthanasia for the relief of unbearable pain and suffering.

Objectives:
1. To assess the attitudes towards Euthanasia among health personnel.
2. To associate the attitudes with the selected demographical variables.

An exploratory descriptive design was used to conduct this study non probability sampling technique was employed, the sample consisted of Health Personnel Doctor & Nurses who are working in Government and Private health institutions at Puducherry informed consent was obtained from the samples.

Tool and Techniques
Self-administered questionnaire was used which consisted of Section A and Section B. Demographic data like Name, Age, Sex, Religion, Educational qualification, Designation, Years of working experience, Place were included in Section A. In Section B to measure the attitude of a person has towards end of life decisions the Euthanasia attitude scale (EAS) was utilized which is developed by Holloway, Hay slip, Murdock et al 1995. It contains 30 statements, it frames in the pattern of likert scale, ranging between 1-4 with the statement of Strongly Agree, Agree, Disagree, Strongly Disagree. Scoring key: The total highest score is 120. The score was interpreted in the following way. 75-120 -Positive attitude towards euthanasia < 74 - Negative attitude towards euthanasia

Results and Findings
The sample size was selected as 100, among only 70 were responded. The structured Euthanasia Attitude Scale (EAS) with 4-points likert scale was used to assess the attitude towards euthanasia.

The responses were analyzed through descriptive statistics, (Frequency, Percentage, Mean, Median, standard deviation and Inferential statistics "t" value and chi-square) by using PASW (18.0 Version) statistical package.
Table (1) reveals the distribution of sample on demographic variables. Among 70 samples, the age group of 25yrs - 35yrs are 45 (64.2%) who were the highest of the other age groups, 36yrs - 45yrs of 20 is 28.5%, 46yrs - 55yrs of 3 is 4.2% and >56yrs of 2 is 2.8%. Sex wise, the females were the highest samples and holds 57% (40) whereas the males were 42.8%(30). Among the samples 52(74.2%) were Hindus, 3(4.2%) of Muslims, 14(20%) of Christians and the other religion showed 1(1.4%). The Hindu religion holds the highest percentage. According to the 26(37.1%) were UG, 36(51.4%) were PG, 4(5.7%) were Doctorate and 4(5.7%) have did other courses. The PG possessed the highest percentage among other graduates. When bring out the occupation samples of 33 (47.1%) were physicians, 17(24.2%) were staff nurses, 12(17.1%) were students and 8(11.4%) were faculties from health teaching profession. The physicians were the highest samples among the group.

Table (2) denotes that among 70 samples 42(60%) have positive attitudes towards euthanasia whereas 28(40%) have the negative attitude.

Table (3) denotes that the comparing the mean score between the male and female. Based on the PASW (18.0) software, The obtained Mean value was 83.07 with SD of 13.036 for males and for females the obtained Mean value was 74.63 with SD of 10.8167 which had been inferred that the t-value = 2.958 and the corresponding p-value < 0.004, Therefore it was concluded that there was significant difference in the average attitude towards euthanasia between males and females. This inference shows that the attitude towards euthanasia was differing according the males and females thoughts, in the study.

In associating the attitude with the related demographic variables (age, sex, religion, designation). The association between attitudes towards euthanasia and different attributes such age, gender, religion, educational qualification, designation, working experience and working place respectively had been seen using PASW (18.0 Version) statistical package. It had been inferred that all the p-values were greater than 0.05. Hence we concluded that there was no association between attitudes towards euthanasia and various attributes such as age, gender, religion and designation respectively and the euthanasia concept is strongly supported.

**Tables**

**Table -1 Distribution of demographic variable** (N=70)

<table>
<thead>
<tr>
<th>Demographic variables</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25 – 35</td>
<td>45</td>
<td>64.2%</td>
</tr>
<tr>
<td>36 – 45</td>
<td>20</td>
<td>28.5%</td>
</tr>
<tr>
<td>46 – 55</td>
<td>3</td>
<td>4.2%</td>
</tr>
<tr>
<td>Above 56</td>
<td>2</td>
<td>2.8%</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>30</td>
<td>42.8%</td>
</tr>
<tr>
<td>Female</td>
<td>40</td>
<td>57.1%</td>
</tr>
<tr>
<td>Religion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hindu</td>
<td>52</td>
<td>74.2%</td>
</tr>
<tr>
<td>Muslim</td>
<td>2</td>
<td>4.2%</td>
</tr>
<tr>
<td>Christian</td>
<td>14</td>
<td>20%</td>
</tr>
<tr>
<td>Others</td>
<td>1</td>
<td>1.4%</td>
</tr>
<tr>
<td>Qualification</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Undergraduate</td>
<td>26</td>
<td>37.1%</td>
</tr>
<tr>
<td>Postgraduate</td>
<td>36</td>
<td>51.4%</td>
</tr>
<tr>
<td>Doctorate</td>
<td>4</td>
<td>5.7%</td>
</tr>
<tr>
<td>Other specify</td>
<td>4</td>
<td>5.7%</td>
</tr>
<tr>
<td>Designation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physician</td>
<td>33</td>
<td>47.1%</td>
</tr>
<tr>
<td>Staff nurse</td>
<td>17</td>
<td>24.2%</td>
</tr>
<tr>
<td>Teaching profession</td>
<td>8</td>
<td>11.4%</td>
</tr>
<tr>
<td>Students</td>
<td>12</td>
<td>17.1%</td>
</tr>
</tbody>
</table>

**Table -2 Distributions Of Samples On Overall Level Of Attitude Towards Euthanasia** N=70

<table>
<thead>
<tr>
<th>Score</th>
<th>Attitude</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>75 – 120</td>
<td>Positive attitude</td>
<td>42</td>
<td>60%</td>
</tr>
<tr>
<td>&lt; 75</td>
<td>Negative attitude</td>
<td>28</td>
<td>40%</td>
</tr>
</tbody>
</table>

**Table -3 comparison of attitude with gender** N=70

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>t-test</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>30</td>
<td>83.07</td>
<td>13.036</td>
<td>2.958</td>
<td>68</td>
<td>.004</td>
</tr>
<tr>
<td>Female</td>
<td>40</td>
<td>74.63</td>
<td>10.817</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Discussion:**

The study was to assess the attitude towards euthanasia among the health personnel. Sneha Kamath et.al. (2012) studied to assess the attitudes of doctors toward euthanasia and possible factors responsible for these attitudes. They concluded that a majority of the doctors supported euthanasia for the relief of unbearable pain and
suffering. The study findings revealed that out of 70 health personnel 42 (60%) had Positive attitude and 28 (40%) had Negative attitude towards euthanasia. Mr. Naser Agababaei et al., (2011) studied on Euthanasia Attitude Scale (EAS) from 197 students in June 2011. They concluded that analyzing the attitude towards euthanasia scale results in lower levels of opposition against euthanasia.

The attitudes of Health Personnel towards euthanasia the highest and the lowest score level out of 120 denoted that the highest score was 110 /120, it showed the strong positive attitude towards euthanasia and the lowest score was 48/120, it revealed that the strong opposition towards euthanasia concept. From the EAS, the 30 items of statements were categorized into 4 divisions that of the concept of supporting euthanasia, the concept of opposing euthanasia, the individual decision on euthanasia and the methods supporting / opposing euthanasia concept. Sneha Kamath et al. (2012) studied to assess the attitudes of doctors toward euthanasia and possible factors responsible for these attitudes. They concluded that a majority of the doctors supported euthanasia for the relief of unbearable pain and suffering. Based on the items of statements from the Euthanasia Attitude Scale (EAS), score of 67.2%( average score of 32.3 out of 48) supports euthanasia whereas score of 63.2% (average score of 40.5 out of 64) oppose the euthanasia concept and 70% (average score of 5.6 out of 8) supports the individual decision towards euthanasia. Based on the methods from EAS, 66.2% (score of 5.3 out of 8) supports the euthanasia concept whereas 63% (score of 5 out of 8) oppose the euthanasia concept. When compare with the assumptions made at the beginning of the research only some health personnel have got the positive attitudes towards euthanasia for a terminally ill client with unbearable pain, but as per the survey 60% of health personnel have positive attitude towards euthanasia, where as 40% have negative attitude. The age group of 35-45yrs (45) and >56 years (2) have positive attitudes towards euthanasia and holds 80.2% and 82% respectively. Based on the gender wise 83.1% of Male supported strongly the euthanasia concept whereas the 74.6% of female leastly supported the euthanasia concept. Based on the religion 84.3% of Muslim and 89% of other religion strongly supported the euthanasia concept. Finally, based on the designation wise the staff nurses and students strongly supported the euthanasia concept and holder 81.2% and 80.5% respectively. Thus we conclude that most of the Health Personnel have got positive attitude towards euthanasia.

Recommendations:
- A comparative study can be conducted among the health personnel.
- Similar type of studies may be conducted in paramedical health personnel.
- A study can be conducted to assess knowledge among the nursing students.

Limitations:
- The sample size was selected as 100, but only 70 were responded.
- Most of the health personnel were busy with their schedule.

Conclusion:
Health personnel had positive attitude towards euthanasia in certain circumstances for terminally ill clients with unbearable pain. So in India passive euthanasia may be implemented according to the Institutional Policy, since it is legalized from 7th March, at all health institutions at certain circumstances.
References:

PREVALENCE OF UNDER-NUTRITION AND ANEMIA AMONG UNDER FIVE RURAL CHILDREN OF SOUTH KARNATAKA, INDIA

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Abstract:
Infant and under five mortality rates are reliable indicators of health status of the children of any country. Despite accelerated growth, the prevalence of hunger, poor health status, under nutrition and mortality in rural part of the country are still persisting in India. While under nutrition among children is pervasive; child mortality is rather high in rural parts of India. The current study conducted in two remote villages of Hassan and Kodagu districts of South Karnataka-India. Study conducted on (Boys 160, Girls 140) preschool children, selected through stratified sampling design technique. Through this study stunting in 75.0 %, wasting in 81.7% and underweight in 87.6% of both Boys and Girls of pre-school children were found. In case of Anemia, 48% of Girls and 56% of Boys were severely affected; while 47% of Girls and 41% of the Boys were modestly affected and 10% of the Boys and 28% Girls observed mildly affected. It is also found that clinical sign of Anemia among 62% of the studied children. Next, 21% children found Vitamin A deficiency and 22% children found vitamin B complex deficiency. The Study also found that only 67% children put on breastfeeding within Three hours after the birth in the studied village. It is also noted that income poverty, bad personal habits, changing health seeking behavior, cultural practices regarding delivery, child rearing and breastfeeding also plays a vital role in case of mortality problem where Government and NGO (Non-Gov. Organizations) should focus on these issues immediately.

Keywords: Mortality, Nutrition, Health, Rural, Children

Introduction:
Under nutrition and childhood mortality became a serious problem among the rural children in many south Asian nations. It is found that social-ethnic background, health seeking behavior and health culture dynamics plays a significant role as few vital determinants of the health status of rural community in a multicultural society like India. Because of unique heath seeking beliefs and behavior under nutrition and childhood mortality are more common in rural areas1. WHO (World Health Organization) report (1985) has found that 57% of the death of under Five children in developing countries accompanied by undernutrition thereby low weight for their age. Medical Anthropologists have revealed that the development of health culture of the rural community should be examine as a sub cultural complex of the entire way of life2. There are a number of forces percolated from the larger socioeconomic environment and guided through the attribute of historical, social and political dimension to the growth pattern of rural health culture in the given settings. A good health required a balanced diet. Under Five children need a good nutritional diet which is scanty in many rural settings in the country and this causes mortality and morbidity among the rural population3.

It is found that Nearly Thirty (30) lakh children in India die before the age of Five due to various health issues. This has become a common phenomenon in rural parts of the country. Various child health indicators reports of the country have shown considerable improvement and infant mortality has gone down from 78 to 57 deaths per 1000 live births and under-five mortality from 109 to 74 deaths per 1000 live births1. However, under-five mortality levels among rural children are still shockingly high (at 97 deaths per 1000 live births). Rural’s constitutes 60 to 62 percent of the total population, but accounts for about 19 percent of...
all under-five deaths, and 23 percent of deaths in the 1-5 age group. In India, the flagship program for preclusion and control of anemia stress on pregnant women and young children less than 5 years. On the other hand, the position of anemia in children is not well recognized, though information on underweight and stunting is available. Hence Anemia in children continues to be given a very little precedence. Despite the marvelous development focusing preventive and curative medicine, the child healthcare delivery services in several rural communities are still poor and unscientific. It is found that poverty, illiteracy, malnutrition, scarcity of potable water, sanitary conditions, poor mother child health services, problems in covering national health and nutritional services, etc. have been found most vital causative factors for the prevalence of sever childhood mortality and morbidity amongst the rural communities in the country. Expert felt the health system of the country need further strengthening in order to achieve the goal of health for all in the country. Further, experts opined that the poor health outcome of the rural community and their children need to be read within in the context of rapid urbanization, poor health infrastructure, costly treatment etc. However, in a multicultural society like India rural childhood mortality cannot be analyzed in a contextual vacuum. Instead, they need to be looked in the light of larger socio-economic changes experienced by the rural community over the period of time due to the interventions of various external agencies. Till now various Governments have implemented numerous programmes to improve the nutritional status of the pre-school children through various innovative schemes. Huge money has been spent on health sector so far. Still country experiences sever under nutrition and rural child mortality issue. Health experts opined that lack of good primary health care, perceived and personal risks, lack of awareness have lead in failing health improvement programmes in the rural settings of the country.

Major Objective: This present study is to assess the extent and prevalence rate of Under-nutrition and Anemia among under Five rural children in the Two districts of south Karnataka, India.

Materials and Methods: This current study conducted in Two remote villages of Hassan and Kodagu districts of south Karnataka. The study had 300 (Boys 160, Girls 140) preschool children, selected using stratified sampling design technique. Household survey carried out in Three villages covering 300 families under the jurisdiction of Four primary health centers (PHC). Anthropometric measurements taken using standard techniques. Infant meter was also used to measure below 1 year old children. Date of birth was obtained from the village directory for cross checking. The indices of nutritional status have been mentioned in Standard Deviation (SD). Diet survey focusing cereals, pulses, milk and milk products, vegetable etc have also been done. Hemoglobin collection and estimation also under the guidance of a physician. Household socio-economic data collected through survey & analyzed using SPSS software. Nutritional deficiency and morbidities recorded under the supervision of the dietician. Children classified after simple clinical test for Anemia and mean anthropometric measurements.

Result:

Table -1 : Demographic Factors of the Studied Families

<table>
<thead>
<tr>
<th>Variables</th>
<th>No. (percentage)</th>
<th>X²</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age of the Parents</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Just above 20</td>
<td>123(41%)</td>
<td>3.657</td>
<td>0.000</td>
</tr>
<tr>
<td>20-30</td>
<td>132(44%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30-40</td>
<td>45(15%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Educational level</td>
<td></td>
<td>2.764</td>
<td>0.000</td>
</tr>
<tr>
<td>Primary education</td>
<td>154(51.3%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High school</td>
<td>88(29.3%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>College</td>
<td>16(5.3%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illiterates</td>
<td>37(12.3%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional education</td>
<td>5(1.6%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occupational Status</td>
<td></td>
<td>3.789</td>
<td>0.000</td>
</tr>
<tr>
<td>Daily labors</td>
<td>34(11.3%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture</td>
<td>167(55.6%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skilled labor</td>
<td>63(21.0%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td>22(7.3%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business</td>
<td>14(4.6%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table -2 : Mean Anthropometric Measurement of Studied Free School Children

<table>
<thead>
<tr>
<th>Age</th>
<th>N</th>
<th>Sex</th>
<th>Height (in cm)</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1</td>
<td>60</td>
<td>M-35</td>
<td>5.1 ± 1.38</td>
<td>5.9 ± 1.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>F-25</td>
<td>5.7 ± 1.61</td>
<td>5.2 ± 1.5</td>
</tr>
<tr>
<td>1-2</td>
<td>60</td>
<td>M-30</td>
<td>7.5 ± 1.38</td>
<td>8.2 ± 2.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>F-30</td>
<td>7.1 ± 1.03</td>
<td>7.5 ± 1.0</td>
</tr>
<tr>
<td>2-3</td>
<td>60</td>
<td>M-38</td>
<td>8.5 ± 1.13</td>
<td>10.5 ± 2.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>F-22</td>
<td>8.1 ± 0.71</td>
<td>11.3 ± 2.8</td>
</tr>
<tr>
<td>3-4</td>
<td>60</td>
<td>M-32</td>
<td>11.5 ± 1.81</td>
<td>13.1 ± 2.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>F-28</td>
<td>10.3 ± 1.70</td>
<td>15 ± 1.3</td>
</tr>
<tr>
<td>4-5</td>
<td>60</td>
<td>M-37</td>
<td>12.5 ± 1.60</td>
<td>17 ± 2.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>F-23</td>
<td>11.3 ± 1.50</td>
<td>16 ± 2.3</td>
</tr>
</tbody>
</table>

Mean ±: Standerd Deviation       M-Male child    F-Female child

Table -3 : Distribution of Pre-School Children according to SD (standard deviation) classification

<table>
<thead>
<tr>
<th>Parameter</th>
<th>-3 SD to -2 SD</th>
<th>-2 SD to -1SD</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight/Age</td>
<td>106 (35.3%)</td>
<td>96 (32.0%)</td>
<td>114 (38.0%)</td>
</tr>
<tr>
<td>Height/Age</td>
<td>102 (34.0%)</td>
<td>103 (34.3%)</td>
<td>108 (36.0%)</td>
</tr>
<tr>
<td>Weight/Height</td>
<td>92 (30.6%)</td>
<td>101 (33.3%)</td>
<td>78 (26.0%)</td>
</tr>
</tbody>
</table>

Table - 4 : Type and Degree of Malnutrition

<table>
<thead>
<tr>
<th>Sex</th>
<th>Stunting</th>
<th>Wasting</th>
<th>Underweight</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Girls</td>
<td>107</td>
<td>(35.6)</td>
<td>137</td>
</tr>
<tr>
<td>Boys</td>
<td>118</td>
<td>(39.3)</td>
<td>106</td>
</tr>
<tr>
<td>Total</td>
<td>225</td>
<td>(75.0)</td>
<td>243</td>
</tr>
</tbody>
</table>

Table -5 : Occurrence of Anemia in Pre-school Children

<table>
<thead>
<tr>
<th>Level</th>
<th>Girls</th>
<th>Boys</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Severe</td>
<td>77</td>
<td>(48.12)</td>
</tr>
<tr>
<td>Modesty</td>
<td>47</td>
<td>(29.3)</td>
</tr>
<tr>
<td>Mild</td>
<td>28</td>
<td>(17.5)</td>
</tr>
</tbody>
</table>

Normal range of Hemoglobin > 12g/dl (gram/deciliter) Figures in parentheses are percentages

Discussion :

A Total of 300 rural pre-school children (Boys 160, Girls 140) examined through this study. It is found that from the Table 1 Boys were slightly taller and heavier than Girls for their ages. Mean anthropometric distribution of studied children (according to weight against age, height against age and weight against height) has revealed that 33% (average) of children are between -2SD to – 3SD and 33.3% (average) of children are between -2SD to 1SD. (Mean anthropometric measurement were used to find out SD and Median calculated based on SD) (Table 2). In case of nutritional status of pre-school children, stunting in 75.0 %, wasting in 81.7 and under weight 87.6 observed in both Boys and Girls (Tab-3). Further, in case of Anemia, 48% of Girls and 56% of the Boys were severely affected; while 47 % of Girls and 41% of the Boys were modestly affected (Tab-4). However 10% of the Boys and 28% Girls observed mildly affected in this study. Further, it is also found that clinical sign of Anemia among 62% of studied children. Next, vitamin A deficiency was found in 21% children while vitamin B complex deficiency found in 22% children.

In depth study found that only 87% children were put on breast feeding within 3 hours after the birth. Our study also found majority of the children did not receive pre-local feeds. It is found that supplementary feeding started after 8 months in the majority of the studied children. The socio-economic data reveals that the majority of them is living in poverty and illiteracy state and belongs to low income group. Still they are depending on traditional healers to solve their various health problems. Normally they will not visit PHCs for any type of health problems. Local PHCs lack infrastructure facilities. Doctors rarely visit the Hospitals. Absence of the lady physicians also one of the reasons why rural women’s don’t like to visit PHCs. Availability of clean potable water is very rare. It is found that age old traditional health seeking behavior towards certain diseases severally hampering their health status. We learn that high Anemia of the children is causing due to poor socio-economic status. Morbidity rate (32.5%) is considerably high in the studied children it is due to poor and unhygienic conditions. It is found that the prevalence of respiratory tract infection, anemia, typhoid, and deficiency of vitamin A &B are more common and it might be due to their food habits. Poor household ecology,
personal habits, cultural practices regarding delivery, child rearing and breast feeding also plays a vital role. It is also noted that the food style of the responded manly causes malnutrition problems. and It is established fact that even though Government, NGOs and other developmental agencies are working for the health issues of the rural people mortality rate is still high in the rural part of the country. Strong awareness about this issue should be created among the rural folk and rural PHCs should be upgraded in a war foot manner.

Conclusion:
Malnutrition in any phase of childhood impacts schooling and the lifetime earnings capacity of the child. Malnutrition also causes economic burden on the state. This study has found that causes of mortality related to malnutrition and lack of timely access to an adequate primary health care service. Study found that Boys were slightly taller and heavier than Girls for their ages. Girls are not showing less physical development to their ages. In case of nutritional status girl children, are more suffering from stunting, wasting and underweight than boys. In case of Anemia, Girls (48%) and Boys (56%) are more or less equally suffering. The more worrying fact is that signs of Anemia have been found among 62% children. Further vitamin A deficiency in 21% children and vitamin B complex deficiency in 22% children were also found. It is found that the occurrence of under nutrition and anemia may be due to low iron bioavailability or absorption rather than inadequate intake. It is noted that availability of pure water, sanitation, traditional beliefs plays a vital role in shaping health behaviors of the rural folks. In partnership with the NGOs and civil society, Govt. should try to provides high-impact, cost-effective health and nutrition interventions to decrease the number of neonatal and child mortality from various infectious diseases for the rural community. Govt. should frame programmes to create awareness about importance of nutritious foods and breast feedings amongst rural folk. Media can also play a vital role in the success of the various immunization programmes. Geographically and cultural specific programmes for the speedy development of the socio economic conditions of the rural community is most necessary for the hour

Acknowledgements:
Author is grateful to Mrs. S. Jyothi lakshmi Dr. P. N. Vengopal (Dietician) and Dr. Srivasta (Physician) for their support
INTRODUCTION:
It is a well known fact that bacterial plaque plays a critical role in the host response leading to the pathogenesis of periodontitis. Poor oral hygiene and exogenous infection change the normal flora into a pathogenic flora. It is a well understood fact that bacterial plaque is involved in pathogenesis of periodontal disease. Studies done by Lang et al in the year 1973 and study done by Sri Lankan tea workers in the year 1985, showed the importance of oral hygiene in maintenance of gingival health.

It has been demonstrated that an effective supragingival oral hygiene even may affect the subgingival microbiota. Effective plaque control is the cornerstone of any attempt to prevent and control periodontal diseases. It was demonstrated that plaque also plays an important role in dental caries, gingivitis and periodontal diseases.

The use of other oral hygiene aids may improve tooth cleaning effectiveness provided that cleaning is sufficiently thorough and performed at appropriate intervals. Tooth brushing and flossing are reported to be fundamental
to reduce the amount of bacterial plaque and its virulence potential, so they are considered the pillar of self-prevention strategy. Several studies have shown the usefulness of regular dental flossing for removing interdental plaque and preventing calculus formation. Both the American Dental Association and the British Dental Association recommended the daily use of dental floss in addition to brushing.

Axelsson and Lindhe and Hellstrom et al. (Hellstrom, Ramberg, Krok & Lindhe 1996) found in a longitudinal study that it was possible to minimize periodontal attachment loss and bone resorption with a combination of improved oral hygiene and professional prophylaxis 6 to 8 times a year. Irregular or not frequent users of dental services have less restored teeth and higher number of carious teeth.

Hence good oral hygiene practices and routine dental visits show a positive result for the preservation of a natural and functional dentition.

The aim of the current study was to investigate knowledge, attitude and practices of oral hygiene and the attitude towards preventive dental visits among health care professionals in south canara district, Karnataka.

Materials and methods:
A cross sectional survey was conducted on 200 health care professionals between Jan 20th to Feb 20th, 2013. Ethical clearance was obtained and consent was taken from all the subjects. The health care professionals included professionals from the field of Physiotherapy, Nursing, Psychiatry and Medicine. 200 health care professionals were asked to answer a questionnaire containing 15 questions. The questions were in relation to the knowledge, attitude and practice of oral hygiene and attitude towards preventive dental visits among health care professionals. The health care professionals were in the age group of 23 to 40 yrs. Which included working graduates and post graduate students. Once the forms were collected, Data was entered in an MS Excel spreadsheet and analyzed through SPSS 16.0

Results:
The results are presented in Tab. 1-14

Source of information on oral hygiene practices
Table 1: From where do you obtain your information on oral hygiene practices?

<table>
<thead>
<tr>
<th>Source</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>from the doctor/dentist</td>
<td>22.3</td>
</tr>
<tr>
<td>from mass media</td>
<td>54.6</td>
</tr>
<tr>
<td>from family and acquaintances</td>
<td>4</td>
</tr>
<tr>
<td>from school /college</td>
<td>19.1</td>
</tr>
</tbody>
</table>

Table 1 gathers the answers concerning the sources of information about the rules of oral hygiene. 54.6% obtained the information from mass media. 22.3% obtained it directly from the dentist. Family and acquaintances were the source for the remaining 4%.

Flossing
Table 2: Do you have any information regarding flossing?

<table>
<thead>
<tr>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>19.5</td>
</tr>
<tr>
<td>Yes</td>
<td>80.5</td>
</tr>
</tbody>
</table>

Among all the subjects 61% had information regarding flossing and 39% were ignorant about flossing.

Scaling effect on enamel
Table 3: Do you feel scaling causes loss of enamel?

<table>
<thead>
<tr>
<th>Option</th>
<th>Number of subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>91</td>
</tr>
<tr>
<td>No</td>
<td>103</td>
</tr>
<tr>
<td>Don’t know</td>
<td>6</td>
</tr>
</tbody>
</table>

Table 3: showed whether the health care professional felt that scaling caused loss of enamel. It can be seen that 45.5% subjects felt that scaling caused loss of tooth material.

Dental visits
Table 4: Factors influencing dental visits

<table>
<thead>
<tr>
<th>Factor</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fear</td>
<td>26</td>
</tr>
<tr>
<td>Lack of financial means</td>
<td>10</td>
</tr>
<tr>
<td>Lack of availability of time</td>
<td>52</td>
</tr>
<tr>
<td>Lack of availability of dentist</td>
<td>32</td>
</tr>
</tbody>
</table>

Table 4: presents the factors influencing dental visits. Most often mentioned cause was unavailability of time in 52% subjects. Another cause was lack of availability of dentist as mentioned by 32% students of dentistry. Fear of dental visit was mentioned by 26% subjects. Additionally 10% felt the lack of financial means was among the main causes which affected the frequency of making a dental appointment.

Chief complaint
Table 5: What is the main cause of making a dental appointment?

<table>
<thead>
<tr>
<th>Cause</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deposits and stains on the teeth</td>
<td>21.89</td>
</tr>
<tr>
<td>Dental caries</td>
<td>33.33</td>
</tr>
<tr>
<td>Dental pain</td>
<td>27.36</td>
</tr>
<tr>
<td>Orthodontic treatment and other causes</td>
<td>17.41</td>
</tr>
</tbody>
</table>
Table 5 lists most common causes that motivate to make a dental appointment. Dental caries was mentioned by 33.33% as the main cause of making a dental appointment. 27.36 felt that dental pain was the main cause followed by 21.89 subjects who felt deposits and stains on the teeth was the main cause.

Table 6: when was the last time you got a professional scaling done?

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never</td>
<td>26.63</td>
</tr>
<tr>
<td>Last 3-6 months</td>
<td>28.64</td>
</tr>
<tr>
<td>Last year</td>
<td>24.62</td>
</tr>
<tr>
<td>More than an year back</td>
<td>19.1</td>
</tr>
</tbody>
</table>

Table 6: showed when last the health professionals got their teeth professionally cleaned. It can be seen that 28.64% got it cleaned in the last 3-6 months. 26.63% never got their teeth cleaned. 24.62 got their teeth cleaned last year. The remaining 19.1% got it done one year back.

Table 7: How often do you visit a dentist?

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Every 3 months</td>
<td>8.7</td>
</tr>
<tr>
<td>Every 6 months</td>
<td>56.3</td>
</tr>
<tr>
<td>once a year</td>
<td>8.2</td>
</tr>
<tr>
<td>Less than once a year</td>
<td>14</td>
</tr>
<tr>
<td>no definite frequency</td>
<td>26.8</td>
</tr>
</tbody>
</table>

Tab. 7 presents the results concerning the frequency of dental visits. It revealed that 56.3% subjects made a dental visit every 6 months. 26.8% subjects did not have any definite frequency. 14% visited the dentist less than once in an year. 8.2% visited the dentist once in an year and 8.7% of them visited once in 3 months.

Brushing frequency

Table 8: What is your brushing frequency?

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>After every meal</td>
<td>22.3</td>
</tr>
<tr>
<td>Twice daily</td>
<td>54.6</td>
</tr>
<tr>
<td>Once daily</td>
<td>4</td>
</tr>
<tr>
<td>Less than once daily</td>
<td>19.1</td>
</tr>
</tbody>
</table>

The remaining few questions were regarding oral hygiene practices of the subjects. It was noticed that 54.6% subjects had a brushing frequency of twice daily. 4% brushed once daily. Brushing after every meal was done by 22.3% subjects.

Tooth brush bristle

Table 9: Which type of tooth brush bristle you use?

<table>
<thead>
<tr>
<th>Type</th>
<th>Number of subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soft</td>
<td>101</td>
</tr>
<tr>
<td>medium</td>
<td>74</td>
</tr>
<tr>
<td>Hard</td>
<td>7</td>
</tr>
<tr>
<td>Don’t know</td>
<td>18</td>
</tr>
</tbody>
</table>

Table 9 showed the type of bristle used by the subjects. 50.5% of the subjects used soft bristle. 37% used medium bristle. 3.5% used hard bristle and 9% were not sure about the type of bristle they used.

Table 10: How long do you brush?

<table>
<thead>
<tr>
<th>Brushing time</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-3 min</td>
<td>33.35</td>
</tr>
<tr>
<td>3-5 min</td>
<td>48.5</td>
</tr>
<tr>
<td>More than 5 min</td>
<td>9.5</td>
</tr>
<tr>
<td>Less than 1 min</td>
<td>5.0</td>
</tr>
</tbody>
</table>

Table 10: brushing time varied in different subjects with 48.5% brushing for 3-5 min, followed by 33.35% who brushed for 1-3 min. brushing for more than 5 min was seen in 9.5% subjects. Less than 1 min brushing time was seen in 5% of the population.

Other oral hygiene aid

Table 11: Do you use any other oral hygiene aid?

<table>
<thead>
<tr>
<th>Type of other oral hygiene aid used</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floss</td>
<td>15.5</td>
</tr>
<tr>
<td>Mouthwash</td>
<td>29.5</td>
</tr>
<tr>
<td>Interdental brush</td>
<td>14.5</td>
</tr>
<tr>
<td>none</td>
<td>41.5</td>
</tr>
</tbody>
</table>

Table 11 discussed the usage of other oral hygiene aids in health care professionals. 41.5% subjects did not use any other oral hygiene aid. 29.5% used mouthwash. Only 15.5 subjects used floss. And 14.5% used interdental brush.

Table 12: If you have information regarding flossing, what is the frequency of your flossing?

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Number of subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never</td>
<td>133</td>
</tr>
<tr>
<td>Once a week</td>
<td>44</td>
</tr>
<tr>
<td>Once a day</td>
<td>13</td>
</tr>
<tr>
<td>More than once a day</td>
<td>10</td>
</tr>
</tbody>
</table>

Table 12: table ten represented the frequency of brushing among the subjects. 133 subjects did not have the habit of flossing. 44 subjects flossed once in a week. 13 flossed once in a day. Flossing more than once in a day was seen among 10 subjects.

Tooth pick uses age

Table 13: Do you have the habit of using tooth pick?

<table>
<thead>
<tr>
<th>Habit</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>after every meal</td>
<td>12%</td>
</tr>
<tr>
<td>whenever required</td>
<td>38%</td>
</tr>
<tr>
<td>no habit of using tooth pick</td>
<td>56%</td>
</tr>
</tbody>
</table>

Table 13: table 12 discussed the prevalence of using tooth pick. 56% had no habit of using tooth pick. 38% used tooth pick only when required. 12% used it after every meal.

Brushing method

Table 14: What is the brushing method you use?

<table>
<thead>
<tr>
<th>Method</th>
<th>frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circular</td>
<td>19.4</td>
</tr>
<tr>
<td>Vertical</td>
<td>19.9</td>
</tr>
<tr>
<td>Horizontal</td>
<td>10.9</td>
</tr>
<tr>
<td>Combination of all of the above</td>
<td>43.3</td>
</tr>
<tr>
<td>No particular method</td>
<td>5.6</td>
</tr>
</tbody>
</table>

Table 14 represented the brushing techniques used by the subjects. It was seen that 43.3% subjects used a combination of vertical, horizontal and circular brushing method. 19.4% had a circular method of brushing. Vertical horizontal and
circular brushing method. 19.4% had a circular method of brushing. Vertical brushing technique was used by 19.9% subjects. Horizontal brushing method was used by 10.9%.

**Discussion:**

The present study investigated the knowledge, attitude and practice towards oral hygiene practices and the attitude towards preventive dental visits of a group of health care professionals.

In the cross sectional study questions were asked to check the knowledge about oral hygiene practices. When asked from where the subjects obtained information on oral hygiene practices, it was observed that 54.6% obtained the information from mass media. 22.3% obtained it directly from the dentist. Family and acquaintances was the source for the remaining 4%.

The subjects were asked whether they had any information regarding flossing. It was noticed in our study that among all the subjects 61% had information regarding flossing and 39% were ignorant about flossing.

There is a common misnomer that scaling causes loss of enamel. Enamel is 97% mineralised. Scaling once in six months will not cause any harmful effect on enamel. The general population should be educated about this fact that undergoing a professional scaling once in six months is very beneficial and should be encouraged.

The subjects answered questions related to their attitude towards oral hygiene practices and dental visits. The subjects were asked about the main factors which influenced the frequency of dental visits. Most often mentioned cause was unavailability of time in 52% subjects. Another cause was lack of availability of dentist as mentioned by 32%. Fear of dental visit was mentioned by 26% subjects. Additionally 10% felt the lack of financial means was among the main causes which affected the frequency of making a dental appointment.

The subjects were asked what is the main cause of visiting a dentist. Dental caries was mentioned by 33.33% as the main cause of taking a dental appointment. Following which 27.36% felt its dental pain. 21.89 subjects who felt deposits and stains on the teeth was the main cause. This showed that subjects were more concerned about dental problems which were related to pain and which affected aesthetics. Hence subjects should be educated about other dental problems which are usually ignored, for instance bleeding gums, recession, mobility etc and thus they should be motivated to treat these problems too at the right time.

The subjects were asked when last the health professionals got their teeth professionally cleaned. The effects of periodontal maintenance care provided every 6 months were compared over 4 years according to Lightner et al. Results indicated that plaque and gingivitis scores improved more in groups receiving more frequent maintenance. Similar results was found by Listgarten et al. and by Rosen et al., they suggested that recall intervals can be extended upto a year for the purpose of reducing periodontal disease progression in individuals with a history of limited susceptibility to the disease. It could be seen in our study that 28.64% got it cleaned in the last 3-6 months. 26.63% never got their teeth cleaned. 24.62% got their teeth cleaned last year. The remaining 19.1% got it done one year back.

It’s well known that, professional plaque removal and regular follow up combined with patient oral hygiene instructions could minimize the level of gingival inflammation and swelling. Lang et al. demonstrated that students who thoroughly removed plaque at least every second day, did not develop clinical signs of gingival inflammation over a 6-week period. This included the use of inter-proximal aids as well as the toothbrush. A recommendation to brush the teeth twice daily should be considered, particularly in patients showing gingival inflammation. The results in the present study indicate that 54.6% subjects had a brushing frequency of twice daily, 4% brushed once daily, 22.4% had the practice of brushing after every meal.

Opinions regarding the merits of hard and soft bristles are based on studies that are not comparable, are often inconclusive, and contradict one another. Softer bristles
are more flexible, clean slightly below the gingival margin when used with a sulcular brushing technique and farther into proximal surfaces.\textsuperscript{20} Use of hard bristled tooth brushes is associated with more gingival recession, and frequent brushers who use hard bristles have more recession than those who use soft bristles.\textsuperscript{21} In our study, we could see that 50% health care professionals preferred to use medium bristle tooth brush. Results showed that, 48.5 % subjects had a brushing time of 3-5 min followed by 33.5%, who had a brushing time of 1-3 min.

Many studies proved that by interdental cleaning, periodontal patients are able to improve clinical outcomes and reduce clinical signs of disease and inflammation \textsuperscript{10}. In our study 41.5 % subjects did not use any other oral hygiene aid like mouth wash, floss and tooth pick. It was seen that 29.5% used mouthwash. 15.5% subjects used floss and 14.5% used interdental brush. Hence there is a clear need for motivation among the subjects to use other oral hygiene aids.

**Conclusion:**

From the above survey it can be seen that majority of the health care professionals are quite aware about the various health care practices. Though more emphasis should be put on usage of other oral hygiene aids. They should be educated about the advantages of using other oral hygiene aids and should be encouraged to use the same.

It can be clearly seen that most of the subjects had main chief complaint of caries and dental pain. These symptoms are important and subjects tend to notice them as they are associated with pain and aesthetics. Deposits and stains on teeth, bleeding gums, recession, and mobility are mostly ignored, so the subjects should be educated about these symptoms. They should be told the consequence of not getting the right treatment at the right time.

The misconception among subjects about loss of enamel during scaling should be corrected. Enamel is the most mineralized tissue in the body with 97% mineral content, so undergoing scaling once in 6 months would not be detrimental to the enamel. Subjects should be encouraged to undergo a scaling once in six months.

Hence, Professional plaque removal and regular follow up combined with patient oral hygiene instructions can minimize the level of dental and periodontal diseases.

**References:**


Introduction:
Overweight has become one of the common health concerns. A few studies have noted a possible association between iron-deficiency anemia and overweight. As many as 3 crore Indians are overweight, and obesity continues rise, says statistics revealed by the National Family Health Survey (NFHS-2010). Around 20% of school-going children are overweight.

Materials and Methods: In this study survey research approach and comparative descriptive design was adopted. The sample size was 300 adolescents. 300 adolescents were selected by convenient sampling technique, out of which 225 were normal weight adolescents and remaining. Among 225 normal weight adolescents 50 adolescents were selected by simple random sampling technique (lottery method) and out of 75 overweight adolescents, 50 overweight adolescents were selected by convenient sampling technique. Initially BMI identified, Taliquis method was used for identifying the anemia. Peripheral smear test used for identifying the iron deficiency anaemia.

Results: The data were analyzed by using descriptive and inferential statistics. The result shows that out of 300 adolescents 75 (25%) of adolescents were overweight. Out of 100 children (50+50) 19 (38%) were anemic in adolescents with overweight and seven (14%) were anemic in adolescents with normal weight. Out of the total 26 adolescents with anemia (19- overweight and 7- normal weight) no occurrence of iron deficiency anemia was found. There is no significant difference in occurrence of anemia between overweight and normal weight adolescence.

Interpretation and conclusion: The findings of the study indicate that majority of the overweight adolescents were anemic compare to normal-weight adolescents. There is no association between the occurrence of anemia and demographic variables like age, food habits, physical activity, menstrual problems etc.

Keywords: Adolescents, anemia, overweight, normal weight, Iron deficiency anemia.
health concerns in the United States. A few small studies have noted a possible association between iron deficiency and obesity.

Obesity is associated with low-serum iron concentrations. The inverse relationship between iron status and adiposity was first reported in 1962, when Wenzel et al, unexpectedly found a significantly lower mean serum iron concentration in obese compared with non-obese adolescents³.

The incidence of overweight in adolescence rapidly rising throughout the world, and also they are prone to get iron deficiency anemia. In an article published in health news on October 5, 2004, reveals that adolescents with higher body mass index are prone for iron deficiency anemia

The incidence of overweight has increased at epidemic rate, over weight among adolescents has become one of the most common health concerns. The general public often perceives that overweight individuals are healthy, well-nourished and free from illness. A few studies have noted a possible association between iron deficiency anemia and overweight.

The prevalence of overweight has been increased because of the lifestyle, socioeconomic status, advancement in entertainment and technology such as television, computer, and video games. Now a days overweight is more common among adolescents. National health and Nutrition examination survey reported that the prevalence of overweight children doubled and prevalence overweight adolescents tripled between 1980 and 2000⁴.

The etiology of the hypoferremia of obesity is uncertain. Among the proposed causes are deficient iron intake from an iron poor diet, and deficient iron stores owing to greater iron requirements in obese adults because of their larger blood volume⁵.

Objectives of the Study:
• To estimate the occurrence of overweight among adolescents.
• To estimate the occurrence of anemia among overweight and normal weight adolescents.
• To estimate the occurrence of iron deficiency anemia among overweight and normal weight adolescents.
• To compare the occurrence of anemia between overweight and normal weight adolescents.
• To find out the association between the occurrence of anemia and selected demographic variables.
• To find out the association between the occurrence of iron deficiency anemia and selected demographic variables.

Materials and methods
A) Study Design
Research Approach:
In this study survey research approach was adopted.
Research Design:
The research design adopted for the study was comparative descriptive design.

b) Subjects
The sample size was 300 adolescents.

c) Specific Methods
300 adolescents were selected by convenient sampling technique, out of which 225 were normal weight adolescents and remaining. Among 225 normal weight adolescents 50 adolescents were selected by simple random sampling technique (lottery method) and out of 75 overweight adolescents, 50 overweight adolescents were selected by convenient sampling technique.

d) Procedures
For identifying the BMI the following assessments were done.

Measuring the height:
Adolescents were asked to remove their shoes and they were made to stand with their back to the height rule (against the wall). Standing in the Frankfurth, by using the inch tape measure the height.

Measuring the weight:
Zero error corrected on the weighing scale. Adolescents were allowed to stand in the weighing machine without
shoe or any objects in hands. Then weight was measured and recorded.

V Determination of Body Mass Index:
BMI is identified by using the following formula,
\[ \text{BMI} = \frac{\text{weight} (\text{kg})}{\text{height} \ (\text{m})^2} \]
For identifying the anaemia the following assessment was done.

V Hemoglobin estimation: (Talliquis method)
By using a spirit swab, fingertip was cleansed and allowed the spirit to dry. By using a lancet, a prick in the fingertip was made and a drop of blood was allowed into the Talliquis paper. Keep it for drying, check the color of the filter paper. From the Talliquis booklet it was compared and hemoglobin level was estimated.

For identifying the iron deficiency anaemia the following assessment was done.

V Peripheral smear test:
Adolescents who have Hb less than 10mg/dl were selected for peripheral smear test. Blood was collected in EDTA vaccutainer and sent to hematology lab for the peripheral smear checking to rule out the iron deficiency.

Results:
Section I
Description of demographic characteristics
Majority, 70 (70%) of the adolescents was girls and 30 (30%) were boys. Most of the adolescents 42 (42%) study in the 11th standard. 74 (74%) of adolescents were consuming mixed diet. 50 (50%) of adolescents were coming to school by private bus. 51 (51%) of students spending the leisure time by watching television. 58 (83%) of adolescence were not taken iron supplementation and 69 (69%) didn’t take de-worming tablets.

Section II
Estimation Of Over Weight Among Adolescents
Percentage of Overweight Adolescents
Out of 300 adolescents 75 (25%) of adolescents were overweight.

Identification Of Anemia Among Adolescents
Number of Anemic Cases Detected Among Overweight and Normal Weight Adolescents
19 (38%) were anemic in adolescents with overweight and seven (14%) were anemic in adolescents with normal weight.

Identification of IDA Among Adolescents
Number of iron deficiency Anemia Cases Detected among Overweight and Normal weight Adolescents
26 anemic adolescents were found among Overweight and Normal weight Adolescents were not having iron deficiency anemia found after the peripheral smear investigation.
There were no iron-deficiency anemia found in the selected samples.

Comparison of the Occurrence of Anemia Between Overweight and Normal Weight Adolescents
Occurrence of Anemia between Overweight and Normal Weight Adolescents
Since t calculated value 1.432 is less than of table value (2.064) at 0.05 level of significance (p>0.05), research hypothesis is rejected. There is no significant difference in occurrence of anemia between overweight and normal weight adolescent.

Section III
Association between Occurrence of Anemia and Selected Demographic Variables
The calculated chi- square values, which is less than the table values (p>0.05) at 5% level of significance.
Hence the research hypothesis H4 is rejected indicating that there is no significant association between occurrence of anemia and selected demographic variables, like age (1.790%), gender (0.356), education (2.552), income of the family (0.431), food habit (3.163), family history of overweight (0.253), mode of transportation (1.210), spending the leisure time (3.240).

Discussion:
The findings of the study indicates that majority of the overweight adolescents were anemic compare to normal-weight adolescents.
### Keywords:
- Adolescents, anemia, overweight, normal weight,
- Iron deficiency anemia - Sujatha R.

### DEMOGRAPHIC VARIABLES

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. AGE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15 years</td>
<td>19</td>
<td>19%</td>
</tr>
<tr>
<td>16 years</td>
<td>38</td>
<td>38%</td>
</tr>
<tr>
<td>17 years</td>
<td>43</td>
<td>43%</td>
</tr>
<tr>
<td><strong>2. GENDER</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>30</td>
<td>30%</td>
</tr>
<tr>
<td>Female</td>
<td>70</td>
<td>70%</td>
</tr>
<tr>
<td><strong>3. EDUCATION</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10th std</td>
<td>22</td>
<td>22%</td>
</tr>
<tr>
<td>11th std</td>
<td>42</td>
<td>42%</td>
</tr>
<tr>
<td>12th std</td>
<td>36</td>
<td>36%</td>
</tr>
<tr>
<td><strong>4. EDUCATIONAL STATUS OF MOTHER</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No formal education</td>
<td>3</td>
<td>3%</td>
</tr>
<tr>
<td>High School</td>
<td>56</td>
<td>56%</td>
</tr>
<tr>
<td>Graduates</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>5. EDUCATIONAL STATUS OF FATHER</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Formal Education</td>
<td>4</td>
<td>4%</td>
</tr>
<tr>
<td>High School</td>
<td>39</td>
<td>39%</td>
</tr>
<tr>
<td>Graduate</td>
<td>57</td>
<td>57%</td>
</tr>
<tr>
<td><strong>6. INCOME OF THE FAMILY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rs&lt;3000</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Rs3001-5001</td>
<td>8</td>
<td>8%</td>
</tr>
<tr>
<td>Rs5001-7000</td>
<td>55</td>
<td>55%</td>
</tr>
<tr>
<td>Rs&gt;7001</td>
<td>37</td>
<td>37%</td>
</tr>
<tr>
<td><strong>7. FOOD HABIT</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetarian</td>
<td>4</td>
<td>4%</td>
</tr>
<tr>
<td>Non-Vegetarian</td>
<td>22</td>
<td>22%</td>
</tr>
<tr>
<td>Mixed</td>
<td>74</td>
<td>74%</td>
</tr>
<tr>
<td><strong>8. HISTORY OF ILLNESS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>35</td>
<td>35%</td>
</tr>
<tr>
<td>No</td>
<td>65</td>
<td>65%</td>
</tr>
<tr>
<td><strong>9. FAMILY HISTORY OF OVERWEIGHT</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>27</td>
<td>27%</td>
</tr>
<tr>
<td>No</td>
<td>73</td>
<td>73%</td>
</tr>
<tr>
<td><strong>10. MODE OF TRANSPORTATION TO SCHOOL</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>By Walking</td>
<td>7</td>
<td>7%</td>
</tr>
<tr>
<td>Cycling</td>
<td>15</td>
<td>15%</td>
</tr>
<tr>
<td>Private Bus</td>
<td>50</td>
<td>50%</td>
</tr>
<tr>
<td>School Vehicle</td>
<td>28</td>
<td>28%</td>
</tr>
<tr>
<td><strong>11. SPENDING THE LEISURE TIME</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Play</td>
<td>33</td>
<td>33%</td>
</tr>
<tr>
<td>Exercise</td>
<td>2</td>
<td>2%</td>
</tr>
<tr>
<td>Watching Television</td>
<td>51</td>
<td>51%</td>
</tr>
<tr>
<td>Reading Books</td>
<td>14</td>
<td>14%</td>
</tr>
<tr>
<td><strong>12. IN TAKE OF DE-WORMING TABLETS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>31</td>
<td>31%</td>
</tr>
<tr>
<td>No</td>
<td>69</td>
<td>69%</td>
</tr>
</tbody>
</table>

### ESTIMATION OF OVER WEIGHT AMONG ADOLESCENTS

Percentage of Overweight Adolescents

<table>
<thead>
<tr>
<th>No. of adolescents</th>
<th>No. of overweight adolescents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>300</td>
<td>75</td>
<td>25.00%</td>
</tr>
</tbody>
</table>

### IDENTIFICATION OF ANEMIA AMONG ADOLESCENTS

Number of Anemic Cases Detected Among Overweight And Normal Weight Adolescents

<table>
<thead>
<tr>
<th>Overweight adolescents n=50</th>
<th>Normal weight adolescents n=50</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>Percentage</td>
</tr>
<tr>
<td>19</td>
<td>38%</td>
</tr>
<tr>
<td>7</td>
<td>14%</td>
</tr>
</tbody>
</table>

### IDENTIFICATION OF IDA AMONG ADOLESCENTS

Number of iron deficiency Anemia Cases Detected Among Overweight and Normal weight Adolescents

<table>
<thead>
<tr>
<th>ADOLESCENTS</th>
<th>ANEMIC CASES</th>
<th>IRON DEFICIENCY NO. %</th>
<th>ANEMIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overweight  n=50</td>
<td>19</td>
<td>38%</td>
<td>Nil</td>
</tr>
<tr>
<td>Normal weight n=50</td>
<td>7</td>
<td>14%</td>
<td>Nil</td>
</tr>
</tbody>
</table>

### COMPARISON OF THE OCCURRENCE OF ANEMIA BETWEEN OVERWEIGHT AND NORMAL WEIGHT ADOLESCENTS

Occurrence Of Anemia Between Overweight And Normal Weight Adolescents

<table>
<thead>
<tr>
<th>GROUP</th>
<th>N</th>
<th>MEAN</th>
<th>t' VALUE</th>
<th>SD</th>
<th>df</th>
<th>LOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal weight adolescents</td>
<td>7</td>
<td>10.6286</td>
<td>1.432</td>
<td>.74992</td>
<td>24</td>
<td>.165</td>
</tr>
<tr>
<td>Overweight adolescents</td>
<td>19</td>
<td>9.7105</td>
<td>1.61689</td>
<td>p&gt;0.05</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

`t' (tab) 24=2.064

Estimation of overweight among adolescents

From the 300 samples 75 (25%) adolescents were identified to be overweight.
Identification of anemia among adolescents:
Out of the 50 adolescents with overweight 19(38%) were anemic and in 50 normal-weight adolescents 7(14%) were anemic. A supportive study was conducted among 317 adolescents (10-19 years) Government school girls in Bhopal city. The adolescents were divided into three groups by random sampling method. Level of anemia was higher in early adolescents (10-13 years) age group (81%) as compared to the middle (58.3%) and late adolescents (17-19 years) age group girls (48.7%).

Identification of iron-deficiency anemia among adolescents.
There was no iron-deficiency anemia found in the 19 (38%) adolescents with overweight and seven (14%) adolescents with normal weight with anemia. So H1 hypothesis is rejected. So there is no significant difference in the occurrence of iron deficiency between overweight and normal weight.

A supportive study was conducted in Israel to identify the prevalence of iron deficiency anemia in overweight, obese and normal weight children. Data was collected from 321 adolescents. The study revealed that iron deficiency anemia was noted among 38.8% of the obese adolescents, 12.1% overweight adolescents and 4.4% of the normal weight adolescents7.

Another study conducted USA to identify Overweight children and adolescents: a risk group for iron deficiency, among 9698 adolescents.

The study revealed that out of 9698 children, 13.7% were at risk for overweight and 10.2% were overweight. Iron deficiency was most prevalent among 12- to 16-year-old subjects (4.7%), followed by 2- to 5-year-old subjects (2.3%) and then 6- to 11-year-old subjects (1.8%). Overweight 2- to 5-year-old subjects (6.2%) and overweight 12- to 16-year-old subjects (9.1%) demonstrated the highest prevalence of iron deficiency. Overall, the prevalence of iron deficiency increased as BMI increased from normal weight to at risk for overweight to overweight (2.1%, 5.3%, and 5.5%, respectively), and iron deficiency was particularly common among adolescents (3.5%, 7.2%, and 9.1%, respectively)9.

A similar study indicated that the prevalence of anemia was 52.88% in the school children of Kattankulathur. The results of the study showed that 52.88% were anemic, the prevalence of anemia in girls (67.77%) was higher than in the boys (35.55%). The prevalence of anemia was very much higher in girls when compared to boys during between the age of 8 and 14 years. The anemia was graded according to WHO standards. It showed that 30.4% of girls were mildly anemic, 37.33% were moderately anemic and there were no severely anemic children diagnosed7.

It was observed that 77.7% of tribal children of Mysore District, Karnataka were suffering from anemia and also indicates similar results that the prevalence of anemia was significantly higher in girls when compared to boys (girls 83.33% and boys 70.89%)10.

The overall prevalence of anemia among school-going adolescent girls of urban Kathmandu, Nepal was 54.4%11.

Another study of 393 children reported the prevalence of 66.4% anemia amongst primary school children (6-11 years) in the national capital territory of Delhi12.

Comparison of the occurrence of anemia between overweight and normal-weight adolescents.
According to independent 't' test there is no significant difference in occurrence of anemia between overweight and normal-weight adolescents. So H2 hypothesis is rejected.

Association between the occurrence of anemia and selected demographic variables
There is no association between the occurrence of anemia and demographic variables like age, food habits, physical activity, menstrual problems etc. So H4 hypothesis is rejected.

Conclusion:
The findings of the study indicates that majority of the overweight adolescents were anemic compare to normal-
weight adolescents. In our society majority of the parents believe that their young child’s excess fat is normal, that it will disappear as the child grows, and that it isn’t a real health concern. This is not the case for most overweight children, who are very likely to become overweight adults. Anemia is high among children heavier and more overweight. Further examination into the causes of anemia and overweight is warranted.

Acknowledgement:
Our sincere thanks to Nitte University for funding this research project and supporting us in every step during the process. We also thank Mrs. Vandhana, Statistician, NUINS, Mangalore, for the guidance provided related to analysis of the study.

Reference:
1. www.indushealthplus.com/karnataka-health-statistics/- 41k
5. Wong’s, Essential of paediatric nursing, 8th edition, Elsevier publication, Missouri.
9. B Sudhagandhi, Sivapatham Sundaresan, W Ebenezer William, A Prema Prevalence of anemia in the school children of Kattankulathur, Tamil Nadu, India, SRM Medical College Hospital and Research Centre, SRM University, Tamil Nadu, India.
EFFECTIVENESS OF SELF INSTRUCTIONAL MODULE ON
KNOWLEDGE OF POST OPERATIVE SELF CARE FOR MOTHERS
UNDERGOING ELECTIVE CAESAREAN SECTION IN SELECTED
HOSPITALS, MANGALORE

Elizabeth Rajan & Sabitha Nayak

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2Vice Principal, Nitte Usha Institute of Nursing Sciences, Nitte University, Mangalore - 575 018, India.

Abstract:
The study was conducted on Effectiveness of self instructional module on knowledge of post operative self care for mothers undergoing elective caesarean section in selected hospitals, Mangalore. The research design was a one group pre test post test design which was a pre experimental research design. 40 mothers undergoing elective caesarean section by purposive sampling.

The pretest knowledge questionnaire was administered to the mothers two days prior to caesarean section, followed by a self instructional module on post operative self care. Post test was conducted after 5 days using the same tool. The collected data were analyzed using descriptive and inferential statistics. The mean knowledge score was 14.98 whereas maximum possible score was 30.

Among the 11 areas, the mean percentage knowledge score in the area of caesarean section and self care was 77.50% bladder and bowel care was 60% breast feeding was 58.40% diet was 52.50% pain management was 47.50% post operative complications and home care was 46% baby care was 44.33% early ambulation and exercise was 44% perineal hygiene was 41% wound care was 40.67% and deep breathing and coughing was 40.67%.

The 't' value showed significant in the post test ('t' calculated value of pretest and post test knowledge scores = 18.000, p<0.001) which showed that self-instructional module was effective in improving the knowledge of mothers on post operative self care after caesarian section.

There was significant association between the level of knowledge and demographic variables namely age parity, education, occupation, monthly income, exposure to health awareness and history of caesarean section.

Keywords : Caesarean section; mothers; post operative self care; self instructional module.

Introduction:
In philosophy, the woman symbolizes the mother's natural feminine characteristics in the universe. A birth of a child is generally viewed as a time of rejoicing, despite the physical pain and exhaustion experienced by many women during childbirth. Usually pregnancy is a normal pathway. Some go with struggle, yet couldn't achieve normal delivery. Such types of mothers are considered for operative delivery. The ultimate aim is to preserve the life and health of the mother and fetus which is successfully done through the process of caesarean section.¹

Today, it is one of the most frequently performed surgeries in the world. Caesarean births are more common than most surgeries due to many factors. One factor, of course, is that nearly 50% of the world population are women, and pregnancy is still a very common condition. However, more important is the fact that a caesarean section may be life saving for the baby, or mother (or both). Caesarean birth is also much safer today than it was a few decades ago. Thus 'caesarean' is not something that should scare, as the ultimate goal is a healthy mother and healthy baby, regardless of the method of delivery.²
Statement of the Problem
"Effectiveness of self instructional module on knowledge of post operative self care for mothers undergoing elective caesarean section in selected hospitals, Mangalore".

Objectives of the Study
1. To assess the level of knowledge on post operative self care among mothers undergoing elective caesarean section.
2. To identify the effectiveness of self instructional module in terms of gain in knowledge among mothers undergoing elective caesarean section.
3. To find the association between the pre test level of knowledge on post operative self care with selected demographic variables.

Background of the Study
Internationally caesarean section rate is on the increase. During the last decade there has been two to three fold rise in the incidence. WHO recommends that the caesarean section rate of 10 – 15% should not be exceeded. But the results of National Sentinel caesarean section audit shows that caesarean section rates are high as above 24% in most of the developed and developing countries. According to the centre for disease control and prevention more than 7Lakh pregnancies per year go to first time caesarean section.3,4

Self care is an integral part of holistic living of one’s life. Self care approach is a challenge in post operative period in the health care system. Post operative period after caesarean section is a time of transition during which the mother must care for herself and for her newborn. Educating the mother preoperatively on post operative self care will help them to practice it as early as possible after the delivery; thereby improving the self care practices and preventing complications.

Conceptual Framework
The framework of the study is based on general system theory model developed by Ludwig Von Bretalanffy (1986). General system theory serves as a model for viewing people as interacting components within a boundary that filters the type and rate of exchange with the environment. A system consists of both structural and functional components. A structure refers to the arrangement of the facts at a given time. Function is the process of continuous change in the system as a matter; energy and information are exchanged with the environment. The client is an open system capable of both input and output related to the environmental influences, interacting with the environment by adjusting the environment to itself. The feedback information of environment in response to the system’s output is used by the system in adjustment, correlation and accommodation to the interaction with the environment.

Review of Literature
An experimental study was conducted on 60 mothers to assess the effectiveness of structured teaching programme on knowledge and practice of breast feeding to primi postnatal mothers of Sir Ivan Stedeford hospital, Chennai. Results showed that the overall mean score of the experimental group was 52.14 in the pretest and 77.38 in the post test, whereas for the control group the overall mean score was 50.48 in the pretest and only 54.19 in the post test (p < 0.001).5

A randomized controlled trial on 200 women on early initiation of oral feeding after cesarean section was conducted by Obafemi Awolowo University Teaching Hospital, Nigeria. The results showed that early feeding group had a shorter mean post-operative time interval to bowel sounds, passage of flatus and bowel movement (p < 0.001). Early feeding group had a shorter mean hospital stay and required less intravenous fluid (p < 0.001). The study concludes that early feeding after caesarean section was well tolerated and safe and can be implemented without an increase in adverse outcome.6

A quasi experimental study was conducted on 80 primi mothers on the effectiveness of planned teaching programme regarding self perineal toileting after delivery in a selected hospital, AndhraPradesh. The results showed that the mean gain level of knowledge between pre and post test in experimental group was 39.89 and that in
control group was 0.09. The calculated t value is 23.6 (P<0.001) shows that there is a significant increase in the level of knowledge in the experimental group than the control group. The researcher concluded that planned teaching is effective in promoting the knowledge on self perineal care after delivery. 7

Methodology:
One group pre test post test design which is a pre experimental research design was adopted.

Sample
40 mothers undergoing elective caesarean section at selected hospitals in Mangalore and who satisfied the inclusion criteria were included as samples.

Data Collection Process
Pre-test was administered to the mothers two days prior to caesarean section on knowledge of post operative self care after caesarean section using structured knowledge questionnaire. The researcher collected the demographic data along with this. It took approximately 30 minutes. After pre test researcher distributed the self instructional module on post operative self care to the mothers. After 5 days of intervention, the researcher administered the post test to assess the level of knowledge of mothers using the same structured knowledge questionnaire.

Results:
The collected data were analyzed by using descriptive and inferential statistics. The findings revealed that highest percentage (42.5%) of mothers were in the age group of 21-25 years. Majority of the mothers (45%) were Muslims. Many of them (52.5%) were primigravida mothers. Most of the mothers (35%) completed high school education. Majority of the mothers (75%) were housewives. Majority of the mothers (80%) had monthly income between Rs.3001 - Rs.10,000. Most (52.5%) of them had no exposure to any of the health awareness. Many of the mothers (52.5%) had history of previous caesarean section.

The data showed that out of 40 mothers maximum number of mothers 24 (60%) had average knowledge. The mean knowledge score was 14.98 whereas maximum possible score was 30. Among the eleven areas, the mean percentage knowledge score in the area of caesarean section and self care was 77.50%, bladder and bowel care was 60%, breast feeding was 58.40%, diet was 52.50%, pain management was 47.50%, post operative complications and home care was 46%, baby care was 44.33%, early ambulation and exercises was 44%, perineal hygiene was 41%, wound care was 40.67% and deep breathing and coughing was 40.67%.

There was significant difference found between the mean pre test knowledge score and mean post test knowledge score (‘t’ calculated value of pretest and post test knowledge scores =18.000, p <0.001) which showed that self instructional module was effective in improving the knowledge of mothers on post operative self care after caesarean section.

There was significant association between the level of knowledge and demographic variables namely age, parity, education, occupation, monthly income, exposure to health awareness, and history of caesarean section.

References:

Keywords: Caesarean section; mothers; post operative self care; self instructional module. - Sabitha Nayak
PERCEPTION REGARDING FEMALE FETICIDE AMONG FEMALES ATTENDING OUT PATIENT DEPARTMENTS OF SELECTED HOSPITAL OF LUDHIANA CITY

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Abstract:
Background: Although the Indian girl child’s position is precarious throughout the country, she remains the most vulnerable in Punjab.

Objectives: To assess the perception of females regarding female feticide.

Study Design: Cross-sectional study.

Materials and Methods: The study involved collection of information regarding perception of females about female feticide using multiple-choice questionnaire. Two hundred and fifty female patients attending medical and surgical OPD’s of selected hospital were recruited in the study by using simple random sampling.

Results: Majority of the females perceived that male child is more preferred in society. Moreover, majority of subjects have the view that female feticide has harmful impact on the society and should be stopped. The suggestion given by subjects to curb this evil practice included enforcement of strict laws, punishment to people and doctor involved and creating awareness regarding the issue.

Keywords: Perception, female feticide, Declining Sex Ratio.

Introduction:
Female feticide is an extreme manifest of violence against women. In India feticide, especially female feticide & sex selections are the worst conditions. It tends to be serious decline in sex ratio in states of India. A sloka of Atharvaveda says “The birth of a girl, grant it elsewhere. Here, grant a son.” Thousands of years later, this thing stands very true in modern times as well, when, despite the so called modernity, industrialization, literacy and equality, parents still pray the same. (Nilanjana Mukherjee)

Female feticide is a major social problem in India and has cultural connection with the dowry system that is ingrained in Indian culture, despite the fact that it has been prohibited by law since 1961. In India, a strong preference for sons exists by abuse of medical technologies. Pregnancies are planned by restoring to differential contraception. Contraception used is based on the number of surviving sons irrespective of family size. Following conception, fetal sex is determined by prenatal diagnostic techniques after which fit female fetus are aborted. (Das Gupta)

The preference for a male child and discrimination against the female child are causing the rapid disappearance of female children in India. 35 million females were found to be missing according to the census of 2001, which was 32 million during 1991. As per the census of 2011, the child sex ratio of India has declined from 927 to 914 females per 1000 males, which is the lowest since the country’s independence. The inhabitants of Punjab, who pioneered the green revolution in the last century, are now heading for a devastating economic and social fall out in the near future due to sharply declining (882 in 1991; 874 in 2001) sex ratio.

In India, a women’s status is associated not only with her reproductive capability but also on her success in delivering a male child, which enhances women’s will to
give birth to a male child (Baligar PV)⁵. However, females can play a significant role to curb this evil, as they are primary person to carry female fetus in their womb. Therefore, present study was conducted to assess perception of females on female feticide.

Materials and Methods:
The cross sectional study was conducted in the outpatient departments of selected Hospital, Ludhiana. Eligibility criteria for inclusion included OPD female patients who can understand or read Punjabi language, and are willing to participate in the study. Two hundred fifty female patients attending medical and surgical OPD’s were recruited in the study by using simple random sampling. Information was collected by administering a pretested questionnaire to the subjects. Questionnaire consisted questions regarding perception of females related to ideal family size, male child preference, reasons for male child preference, reason for less preference for female child, reason for the practice of female feticide, view point supporting and against female feticide. Before finalizing the questionnaire, pre-testing was done on 10% of females to see appropriateness of tool and based on its necessary changes were made, and then the questionnaire was administered to the study subjects. The subjects were not permitted to communicate with each other. Data were entered and analyzed by means of simple comparisons and proportions

Results and Discussion:
Maximum 59.2% subjects were in age group of 21-40 years followed by 30.4% subject in 41-60 years of age group and least 10.4% subjects were in age group of ≥ 60 years. Maximum 60% of subjects studied below graduation and 40% were with educational status of graduation and above. Majority 90.4% of subjects were married, 8.4% were unmarried however only 1.2% of subjects were divorced. Maximum 74.8% of the subjects were homemaker followed by 17.2% doing service and least 8% were businesspersons. Majority 93.6% of the subjects perceived one boy and one girl as ideal family size (Table 1). Maximum 80.80% (202) of subjects agreed to the statement that male child are being more preferred in the society. Among them, 32.1%, 31.6% and 31.1% of the subjects perceived male child are important to run a family, they carry name of family and they take care of parents in old age respectively as the reasons for male child preference (Table 2). A.H. Gilany and E. Shady conducted a similar study to measure determinants and causes of son preference among women delivering in Mansoura, Egypt. The main reason found for son child preference over girl child were that the male child inherit family business/land (37.7%), contribute to family income (33.3%), help family in business/land (45.2%) ,provide old age care/support (21.5%) and Continue family name (14.5%).

Table 1: Perception of subjects towards ideal family composition and size.

<table>
<thead>
<tr>
<th>Ideal Family size</th>
<th>Number of Subjects (f)</th>
<th>f (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. One boy, One girl</td>
<td>234</td>
<td>93.6</td>
</tr>
<tr>
<td>b. Two boys</td>
<td>08</td>
<td>3.20</td>
</tr>
<tr>
<td>c. Only one boy</td>
<td>06</td>
<td>2.40</td>
</tr>
<tr>
<td>d. Only one girl</td>
<td>02</td>
<td>0.80</td>
</tr>
</tbody>
</table>

Table 2: Perceived reasons for male child preference by subject.

<table>
<thead>
<tr>
<th>Reasons for male child preference</th>
<th>Number of Subjects (f)</th>
<th>f (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Male child are important to run a family</td>
<td>65</td>
<td>32.2</td>
</tr>
<tr>
<td>b. They carry name of family</td>
<td>64</td>
<td>31.6</td>
</tr>
<tr>
<td>c. They take care of parents in old age</td>
<td>63</td>
<td>31.2</td>
</tr>
<tr>
<td>d. Help family in business/land</td>
<td>07</td>
<td>03.5</td>
</tr>
<tr>
<td>e. Any other*</td>
<td>03</td>
<td>01.5</td>
</tr>
</tbody>
</table>

* They raise power/status to the family
* They are needed for death ceremonies of parents

Majority 72% (180) of the study subjects agreed to the statement that the female child is being less preferred. Among these maximum 35% and 33.9% of subject perceived dowry system and increase crime towards girls as the reasons for less preference of female child. However 19.5% of the subject had a view point that female child are considered as burden on family, which enhances female feticide practice (Table 3). Srivastava et al. (2005) interviewed 200 married men and women to elicit their attitude towards the girl child and the declining sex ratio in Bhopal. The study found that the reasons for not wanting girls include that bringing up girls is a costly affairs and a wasted investment, they have to be married off, arranging for dowry is difficult, there is fear of providing safety even inside home, and she is subjected to harassments.
Table 3: Perceived reasons for less preference of female child  

<table>
<thead>
<tr>
<th>Reasons for less preference to female child</th>
<th>Number of Subjects (f)</th>
<th>f (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Girls cannot take care of their parents in old age</td>
<td>17</td>
<td>09.4</td>
</tr>
<tr>
<td>They are consider as burden on family</td>
<td>35</td>
<td>19.5</td>
</tr>
<tr>
<td>Due to dowry system</td>
<td>63</td>
<td>35.0</td>
</tr>
<tr>
<td>Due to increase crime towards girls</td>
<td>61</td>
<td>33.9</td>
</tr>
<tr>
<td>Any other*</td>
<td>04</td>
<td>02.2</td>
</tr>
</tbody>
</table>

*Marriage expenses  
* Due to social norms

Maximum 40.4% (101) of the study subjects had viewpoint that illiteracy is responsible for female feticide. Poverty (19.6%) and family pressure with rituals and customs (17.2%) were also perceived as contributory factors for this evil. However, least 11.4% each believed that determination of sex and desire of son are responsible for female feticide. Maximum 91.6% (229) subjects responded that practice of female feticide is morally wrong, however 8.4% (21) responded that practice of female feticide is morally right. Females who were in favor of this practice supported this reason that it is easy to rear up male child than female child (33.3%), boys are important to run a family (28.6%) and multiple girl child can cause burden on the family (23.8%). (Table 4) Females opposing this practice perceived that girls deserve equal status in family (38.9%), girls are more responsible towards parents and family (16.6%). (Table 5) Shashi Manhas and Jabina Banoo in their attempt to study the perception and beliefs regarding female feticide among Muslim community of Jammu found that majority of fathers (96%) and mothers (82%) believes that female feticide is morally wrong. However, (18 %) mothers responded that it is morally right (4%) fathers responded that there is no harm in this practice.

Table 4: Females view points for supporting the practice of female feticide.  

<table>
<thead>
<tr>
<th>Females view points for supporting the practice of female feticide</th>
<th>Number of Subjects (f)</th>
<th>f (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys are important to run a family</td>
<td>6</td>
<td>28.6</td>
</tr>
<tr>
<td>It is easy to rear up male child than female child</td>
<td>7</td>
<td>33.3</td>
</tr>
<tr>
<td>Multiple girl child can cause burden on the family</td>
<td>5</td>
<td>23.8</td>
</tr>
<tr>
<td>Due to social norms</td>
<td>3</td>
<td>14.3</td>
</tr>
</tbody>
</table>

Table 5: Females view points for opposing the practice of female feticide.  

<table>
<thead>
<tr>
<th>Females view points for opposing the practice of female feticide</th>
<th>Number of Subjects (f)</th>
<th>f (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Girls are more responsible towards parents and family.</td>
<td>38</td>
<td>16.6</td>
</tr>
<tr>
<td>Girls deserve equal status in family</td>
<td>89</td>
<td>38.9</td>
</tr>
<tr>
<td>Girls are important part of society</td>
<td>57</td>
<td>24.9</td>
</tr>
<tr>
<td>Every individual has right to live</td>
<td>31</td>
<td>13.5</td>
</tr>
<tr>
<td>Girls take care of parents in old age</td>
<td>14</td>
<td>06.1</td>
</tr>
</tbody>
</table>

Maximum 82.4% (206) of the study subjects perceived that female feticide has harmful impact on society. Among these 36.8% and 29.1% opinioned that social problems in society and marriage problems for males will arise due to female feticide respectively. (Table 6) However, 17.6% of the subjects perceived female feticide as beneficial to the society. They support this belief with reasons, as female feticide will decrease crime towards females (15.9%), decrease population (38.6%), and increase power of females in the society (15.9%). (Table 7)

Table 6: Perceived harmful impact of female feticide on society.  

<table>
<thead>
<tr>
<th>Perceived harmful impact of female feticide on society</th>
<th>Number of Subjects (f)</th>
<th>f (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marriage problem for male will arise</td>
<td>60</td>
<td>29.1</td>
</tr>
<tr>
<td>It will effect mother psychological health</td>
<td>28</td>
<td>13.6</td>
</tr>
<tr>
<td>It will lead to social problem in society</td>
<td>76</td>
<td>36.9</td>
</tr>
<tr>
<td>Number of rape cases and other crime will develop</td>
<td>34</td>
<td>16.5</td>
</tr>
<tr>
<td>Raise power status of male in family</td>
<td>08</td>
<td>03.9</td>
</tr>
</tbody>
</table>

Table 7: Perceived beneficial impact of female feticide on society.  

<table>
<thead>
<tr>
<th>Perceived beneficial impact of female feticide on society</th>
<th>Number of Subjects (f)</th>
<th>f (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crime towards female will decrease</td>
<td>07</td>
<td>15.9</td>
</tr>
<tr>
<td>Population will decrease with female feticide</td>
<td>17</td>
<td>38.6</td>
</tr>
<tr>
<td>Female feticide will decrease when number of girls will decrease</td>
<td>10</td>
<td>22.7</td>
</tr>
<tr>
<td>It will be easy for government to Run a country</td>
<td>03</td>
<td>06.8</td>
</tr>
<tr>
<td>Value of woman will increase</td>
<td>07</td>
<td>15.9</td>
</tr>
</tbody>
</table>

Majority 96% females responded that female feticide has an impacts on mothers as it arise psychological problems among mothers (55.2%), develop feeling of guilt or crime among mothers (36.4%), and can cause behavioral changes in mothers (4.4%). Majority 98% (245) subjects had an opinion that female feticide can be stopped by taking various measures. (Table 9)
Table 9: Perceived ways to stop female feticide

<table>
<thead>
<tr>
<th>Perceived ways to stop female by the subjects</th>
<th>Number of Subjects (f)</th>
<th>f (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>By giving punishment to people and doctor</td>
<td>83</td>
<td>33.8</td>
</tr>
<tr>
<td>By enforcing strict law</td>
<td>100</td>
<td>40.8</td>
</tr>
<tr>
<td>By providing financial aid to families with girls child</td>
<td>17</td>
<td>06.9</td>
</tr>
<tr>
<td>By creating awareness regarding this issue</td>
<td>35</td>
<td>14.8</td>
</tr>
<tr>
<td>Giving equal status to men and women</td>
<td>10</td>
<td>04.0</td>
</tr>
</tbody>
</table>

Conclusion and Recommendations:
The study reveals that majority females have awareness about causes and harmful impact of female feticide, and oppose this evil practice. However, maximum females have an opinion that Government should strictly enforce laws against female feticide and punish people and doctors involved in this practice. In addition to this, efforts should be taken to create awareness regarding this issue and to ensure equal status among men and women. As females are important stakeholders in elimination of the practice of female feticide, it is recommended that this group should be equipped with ample amount of knowledge so that they can act as change mediators in the society.

References:
SURFACE TOPOGRAPHY OF DENTAL IMPLANTS

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Abstract:
Surface treatment of titanium implants has been a new frontier in clinical dentistry. Usually it is based on additive and subtractive techniques that modify the surface topography of implants. It alters the roughness/smoothness of the implant surface which becomes more favourable to achieve osseointegration. This modified surface exhibits varied biological responses when the implant is placed in the oral cavity. This article reviews the principles behind treating the surface of titanium, the numerous methods employed for treating the surface and the cellular response elicited. A complete electronic search and hand search has been conducted for the purpose.

Keywords: Dental Implants, Surface treatment, topography, osseointegration.

Introduction:
Early osseointegration determines the clinical success of dental implant therapy¹. In order to achieve such early osseointegration, delicate surgical technique during implant placement, geometry and surface topography of the implant are very crucial factors²⁵. Immediately after fixture placement titanium reacts with body tissues and fluids. Two possible types of response observed would be formation of fibrous tissue capsule, which causes clinical failure of implant therapy and the direct contact of bone to implant, which is called as osseointegration¹. In the latter there is no intervening connective tissue layer and the fixation is usually biological. The surface properties of titanium have been found to have an influence on the rate and quality of biological fixation. Surface properties include composition, energy, topography, hydrophilicity and roughness. These are interrelated and individually they determine the clinical outcome of implant therapy. Numerous in vivo and in vitro tests⁶¹⁶ have been performed to analyze the exact role of surface chemistry on osseointegration. But due to poor standardization techniques and lack of comparative studies between different surface treatment procedures, understanding this aspect of osseointegration is incomplete. This review focuses on the different surface treatment methods and a comparative evaluation of the different techniques and the cellular responses observed as a result of the treated surface.

Surface Chemical Composition And Roughness
Chemical composition and roughness of the implant surfaces have been known to play a crucial role in development of osseointegration. The titanium implants used presently have different surface compositions based on the type of metal used. For dental applications, Titanium is used in pure form (CpTi) or alloyed with aluminium and Vanadium (Ti6Al4V). Based on the content of oxygen, carbon and iron, CpTi has graded as 1-4 and alloy has been placed as grade 5⁶¹⁶.

The reaction of water or body fluids on to the implant surface depends on the surface composition. A surface which will increase the hydrophilicity has found to be preferable. Numerous authors have attempted to
determine the ideal contact angle of the surface of the implant which could make the surface hydrophilic. It is suggested that shallow contact angle of 0° enhances hydrophilicity and contact angle of 140° results in hydrophobicity\(^{17-22}\).

Surface morphology enhances osseointegration by directing protein adsorption kinetics. Osteoblasts tend to attach more readily and their differentiation occurs more easily on a rough surface.

A turned/machined implant has a smooth surface macroscopically and it has been in use for several decades after Prof PI Branemark invented implants. In machined implants bone contacted only the tip of the thread and not the root of the thread and also there is no connection between peri implant bony surface and implant surface. Since there is a delay in osseointegration and later loading of the implants by the prosthesis, the need for hastening the process is felt. Ever since, the implant surface has undergone tremendous metamorphosis in its roughness. The roughness of titanium implants has a direct effect on osseo integration and its bio mechanical fixation\(^{23, 24}\). Three levels of surface roughness have been identified. They are macro, micro and nano size topography.

Macro level ranges from millimetres to tenth of microns. High surface roughness increases early osseointegration and stability. But increase in ionic leakage is a potential problem since it may lead to peri implantitis\(^{25-29}\).

Micro level ranges from 1-10 micrometers. Maximum interlocking between bone and implant surface occurs at this level according to Wennerberg et al\(^{26, 27}\). According to Hansson\(^{30}\) ideal surface should be covered with hemispherical pits 1.5um in depth and 4 um in diameter\(^{31}\). Implants with surface roughness are mainly indicated where poor quality of bone is present. Rough surface increases bone to implant contact enhancing superior clinical results\(^{32}\).

Brett\(^{33}\) proposed that nano level roughness helps in protein adsorption and osteoblasts adhesion. The potential drawbacks are, difficulty in achieving nano level roughness and quantifying the above mentioned protein adsorption and adhesion of osteoblasts. So far only few studies have been reported with nano surface modifications in a reproducible manner. The roughness formed in the nano meter level positively guides osteoblasts to attach Ti surface implant. Further, it also helps in primary healing.

**Titanium Plasma Spraying (TPS)**

This utilises a plasma torch through which titanium powders are injected at high temperatures. Then these titanium particles are sprayed on the surface of implants. A film of 30um thick is formed on the implant surface due to condensation and fusing. Ideal thickness must be 40-50 um with levels of roughness reaching 7 um. Buser et al\(^{34}\) stated that this configuration increased tensile strength at bone-implant surface. Roccuzzo\(^{34}\) compared Sand Blasted Acid Etched (SLA) and TPS implant surfaces and found no significant difference between those two. Taba Junior et al\(^{35}\) conducted a study in which TPS demonstrated inferior bone-to-implant contact when compared to plasma sprayed hydroxyapatite coated implants. Few authors\(^{31, 36}\) suggested the use of micro level surface roughness while using TPS. The main drawbacks of this procedure are porosity of coating and residual stress development in the coated surface. Few cases of loosening of the coating and delamination has also been reported\(^{30}\).

**Sand Blasted Acid Etched (SLA) Treatment**

In this method, surface is bombarded with aluminium oxide (Al2O3) particles and later followed by acid etching. This treatment results in formation of titanium hydride layer, which increases the mechanical properties of the implant. Uniform micro pits of 1-2 um diameter were formed which results in increased bone-to-implant contact\(^{37}\).

**Grit Blasting**

In this procedure, hard ceramic particles are used to roughen the surface of dental implants. Alumina, titanium Oxide (TiO2) and Calcium Phosphate particles have been used for this purpose, because they are chemically stable and biocompatible. These particles are delivered through a
nozzle at high velocity using compressed air. The size of these particles determines the surface roughness achieved.

Alumina is a commonly employed blasting material. However, main problem is that it gets embedded on the implant surface and cannot be removed by ultrasonic cleansing, acid passivation and sterilization. Since it is acid insoluble it is hard to remove thus leading to differential surface composition on titanium surface. Aparico et al³⁸ showed that this chemical heterogeneity decreases corrosion resistance of titanium in physiological environment.

Titanium oxide particles of size 25um produce roughness of 1-2 um. Ivanoff³⁹ demonstrated higher bone to implant contact of TiO2 blasted implant surface when compared to machined surface. Researchers³⁹-⁴² showed higher bone implant contact, positive success rates and higher marginal bone levels of TiO2 blasted implants. Abron et al showed that torque force increased with increase in surface roughness while positive bone apposition was observed. Roughening of implants increases the mechanical fixation and not biological fixation.

Calcium phosphates like hydroxyapatites and β tricalcium phosphates have also been used because they are bio compatible, osteoconductive and resorbable. Novaes et al⁴⁴ and Piatelli et al⁴⁵ seperately demonstrated higher bone- to- implant contact of these surfaces when compared to machined surfaces.

Acid Etching:
Strong acids like HCl, H₂SO₄, HNO₃ and HF produces micro pits ranging from 0.5um to 2 um in diameter⁴⁶,⁴⁷. Wong et al⁴⁸ showed increased osseo integration as a result of acid etching. Micro rough surface is produced by immersing titanium implants in concentrated solution of HCl and H₂SO₄ heated above 100°C. This is called as dual acid etching. Cho and Park⁴⁹ stated that the above processes increase osseointegration and help in long term success of implant therapy. Park and Davis⁵⁰ demonstrated that dual acid etching increases osseo conduction and causes bone deposition directly on the implant surface. Several authors⁵¹,⁵⁴ reported increased bone to implant contact and reduced bone loss compared to TPS and machined surfaces. According to Novaes⁵⁵ and Papalexiou⁵⁶ homogenous micro porous surface with higher bone to implant contact results from high temperature acid etching as compared to TPS surfaces. Surface wettability provides fibrin adhesion which guides osteoblasts migration over the implant surface. Buser et al⁵⁷ showed improved bone to implant contact of the hydrophilic surface. Qahash⁵⁸ conducted an animal model study in which he concluded surface dual acid etching accelerates osseo integration both in newly formed and native bone irrespective of differing bone densities. Sand blasted acid etched implants can be restored successfully after a 6-12 week healing period. According to Nelson et al.⁵⁸ acid etched titanium surfaces shows increased fibronectin absorption when compared to machined surfaces.

Fluoride treatment of titanium produces surface roughness favouring osseo integration. titanium forms soluble titanium fluoride which produces osteoblast differentiation⁵⁹. Ellingsen⁶⁰,⁶¹ demonstrated greater resistance to push forces and increased torque for removal when implants are fluoride treated. This increases bio activity at the implant surface.

Yokoyama⁶² showed that acid etching causes hydrogen embrittlment of titanium causing microcracks leading to decreased fatigue resistance. He also explained formation of a brittle hybrid phase causing decreased ductility which causes fracture.

Anodization:
When strong acids are used at high density and potential of current (200A/m², 100V), it results in micro or nano surfaces. Anodization is employed to thicken the surface oxide layer upto 100nm⁶³,⁶⁴. According to Sul⁶⁵,⁶⁶ modifications in microstructure and crystallinity are produced as a result of anodization. Anodization depends on density of current, acid concentration and electrolyte composition. Sul and Rocci⁶⁷-⁶⁹ postulated increased
biomechanical and histomorphometric values for anodization when compared to machined surfaces. Jungner\textsuperscript{70} demonstrated higher clinical success of anodized dental implants. Both Mechanical interlocking and Biochemical bonding occurs due to anodization. Magnesium, sulphur, calcium and phosphorous was used by Sul\textsuperscript{65,66} to modify surface oxide layer of titanium. According to Sul\textsuperscript{65,66}, magnesium ions provide increased removal torque values when compared to other ions.

**Ion Implantation\textsuperscript{71}**

It is a procedure where in sodium, calcium and phosphorous ions are implanted onto the surface of implants to modify their topography at a dose of 1 into $10^{-17}$ ions/cm$^2$ utilizing a beam energy of 25KeV and a vaccum of $10^{-6}$ Pa. A novel technique of double implantation was also followed where Calcium ions were implanted followed by phosphorous ions. Care must be taken not to exceed the temperature above 40°. This technique increased the corrosion resistance of titanium and also accelerated osseointegration. The highest corrosion resistance was seen in Ca+P implanted titanium. Implants were treated initially with alkali to achieve heterogenous nucleation of Ca and P, since mechanical stability of this coating depends on rough surface of titanium. Presence of hydroxyl groups is a major necessity for calcium and phosphorous deposition since it provides sites for adsorption of ions from body fluids.

**Alkali and Heat Treatment**

Here, the implants are soaked in 10M NaOH at 60° for 8 hours. Then it is washed with de ionised water and dried at 40° for 24 hours. Further these were heated gradually from 500° to 700° at rate of 5°/ min and then allowed to cool at room temperature. Krupa et al\textsuperscript{72} found out that increase in temperature increases corrosion resistance. This also increases bone bonding ability without causing roughening of the surface. According to Kim and Kokobo\textsuperscript{72} alkali and heat treatment form a bone like apatite that binds to bone apatite chemically forming high bond strength. The above mentioned effect was demonstrated by applying fluorescent agent on the treated surface since it is difficult to cut titanium to be visible in light microscope. When implants are alkali and heat treated it forms a foci over which bone matrix is deposited. The apatite formed due to this treatment is similar to inorganic component of bone. The apatite is formed by amorphous sodium titanate that is preformed on the metal after treatment. This is a complex process which occurs as a result of electrostatic interaction between surface of metal and fluids in the body. Ban proved that alkaline treatment is a simple and effective procedure for surface modification of titanium and it also increases adhesion to resin by formation of rutile particles.

**Bio Mimetic Agents**

Bio ceramics, bioactive proteins, ions and polymers constitute biomimetic agents. According to shin a bio mimetic agent is one that has been designed to elicit specified cellular responses, mediated by interactions with scaffold- tethered peptides from extra cellular matrix. According to glossary of implant dentistry bio mimetic material is one which is able to replicate/ imitate a body structure (anatomy) and/or function (physiology). The material must be easy to manufacture causing no allergic or immune response. Further it must have good differentiating capacity being chemically stable and economical. Biomimetic layer on the implant surface is a valuable alternative to other surface treatment modalities. Munisamy et al\textsuperscript{74} developed a newer method to deposit cone like collagen mineral compositie layer, which increased osseointegration in vitro. Higher percent of success is noticed when the mineral formed is similar to the one present in tissue itself. Recently biomimetic implants are available commercially and prove to have faster osseointegration. But further studies are required in this discipline to understand better the way of accelerated osseointegration and comparative studies with other surface treatment modalities.

**Biologically Active Drugs**

Tgf, Igf and Pdgf are employed with dental implant therapy these days. Care must be taken to ensure gradual release of the substance rather than a instant release. Bis phosphonates are drugs that prevent resorption of bone
and they can be coated on implants used in bone deficiency regions. According to Josse et al bis phosphonates increase bone density at the vicinity of the implant. Other studies using these drugs also showed increase in bone contact area and absence of negative effects. But the optimal dose of these drugs to be coated onto the implant surface is yet to be determined.

Lasers
Lasers are used in dentistry for decades for cutting hard tissues. CO₂ lasers were the first lasers to be used. Now lasers occupy a prime position in every field of medicine including dentistry. Bacterial infiltration of peri implant tissue reduces success rate of implant therapy. Hence, an adequate maintenance of peri implant tissues is a must for successful osseo integration. Other than plastic curettes and bactericidal chemicals, lasers also are an adjunct for peri implant sterilization. Lasers are mainly used while exposure of cover screws (stage II surgery). The most commonly used lasers are CO₂ laser and NdYag laser. They are used in surface treatment of implants. However, higher doses of CO₂ laser (3.5-5v) cause destruction of micro machined groove. When focussed, CO₂ lasers are employed no discoloration of titanium is seen. In contrast, NdYag laser treatment surface melting, porosity loss and other damages were observed. The damage observed was proportional to the dose applied. NdYag lasers are also used for decontaminating the surface of failing and diseased implants. Also laser treatment did not sterilize plasma sprayed titanium and plasma sprayed Hydroxyapatite (HA) coated titanium. Park et al contraindicates use of lasers as they cause peri implant soft tissue damage while used near endosseous implants. CO₂ lasers gets reflected from the implant surface, so they do not cause temperature rise and more useful in surface implant treatment.

Critical Evaluation of Different Surface Treatment Procedures
TPS increases tensile strength at the bone implant surface and surface is similar to SLA treated surface, but it causes porosity, delamination and loosening of the coating. Grit blasted implant surface demonstrated higher bone-to-implant contact and good marginal bone levels. Grit blasted implants have 31% contact with bone and is much higher when compared to porous (17%) and polished (15%) implants. But grit blasting produces differential surface composition and chemical heterogenicity, which decreases corrosion resistance of titanium. Acid etching results in increased bone-to-implant-contact and reduced marginal bone loss when compared to TPS and machined surfaces. Irrespective of differing bone densities acid etching accelerates osseo integration and also demonstrated increased fibronectin absorption. But this procedure causes micro cracks on titanium surface which decreases the fatigue resistance. Anodization increases removal torque values, because it causes both mechanical interlocking and bio chemical bonding. Implantation of calcium, sodium and phosphorous ions increases corrosion resistance and hastens osseo integration. SLA treatment has shown higher clinical success rates and forms uniform diameter pores. But acid etching decreases surface roughness after sand blasting. Alkaline treatment is a simple procedure for surface modification. It forms an apatite similar to inorganic component of bone. This increases bonding to bone without roughening of the surface. Bio mimetic agents increase osseo integration but further studies are required in this discipline. Implantation of biologically active drugs onto the implant surface is being practiced off late. But optimal dose of these drugs is yet to be determined. CO₂ lasers are reflected back so they are used in surface treatment. They are also used on diseased and failing implants. But studies showed that they cause peri implant soft tissue damage. Electron beam radiation decreases surface roughness and causes polishing of the surface, so it cannot accelerate osseo integration. None of the surface treatment procedures have been proved optimal. Every manufacturer has its own theory for the treatment procedure they follow. So the search for ideal surface treatment method is not complete.

Cellular Responses To The Surface Treatment Procedures
Cell attachment on the implant surface takes by direct and
indirect methods. Physico chemical links are responsible for direct attachment and proteins such as fibronectin and vibronectin helps in indirect attachment. Fibronectin is the earliest protein produced by the tooth and bone forming cells.

Wang et al stated that carbonate apatite globules is necessary for adequate cell attachment. Ti OH groups which is seen on the titanium surface is the major driving factor for the formation of calcium and phosphate precipitates. Fibroblast growth and adhesion depends on the intrinsic chemical composition of the material rather than roughness of the surface. Osteoblasts attach more on the blasted surface when compared to acid etched and TPS surfaces. Also TPS and smooth surfaced implants showed lesser levels of alkaline phosphatase activity. Major emphasis is placed on ALP because it is the earliest marker for osteoblast differentiation. Micro rough surfaces ranging from 7 -10um give the optimum environment for osteoblast differentiation. Since sand blasting gives such optimum surface, osteoblasts adhere more readily over these surfaces.

Recombinant human bone morphogenic protein 2 (rh BMP2) forms fine trabecular woven bone along the surface of the implant. It also increases osteogenic activity without any obvious compression of tissues.

A machined implant treated subsequently with acid and alkali demonstrated higher attachment and growth of bone forming cells. Ban showed that acid etching reduces bone marrow cell proliferation.

NaOH and heat treatment results in uniform formation of the sodium titanate layer on the metal. This treatment modality results in bone growth into the porous surface created by it. This results in reducing immobilization time prior to loading. The stability obtained is long lasting since a bone like apatite layer is formed. But few studies have shown the bio activity obtained as a result of alkaline and heat treatment is limited and not satisfactory.

Amorphous surface is formed as a result of implantation of ions, which is not advocated for apatite layer formation.

Higher calcium phosphate ratio is seen on fluoridated implant surface when compared to anodizes, alkali treated and heat treated implants and hydroxyapatite coated implants. But the above studies have been done on simulated body fluid which lacks many components contained in human plasma.

Anodization of dental implant surface produces osteoblasts which has higher alkaline phosphatase activity. Since anodization results in higher surface roughness it causes increased calcium and phosphorous deposition. Anodization followed by hydrothermal treatment demonstrated best bio activity. Also ALP production increases with increased B glycerophosphate production. But the validity of the above mentioned responses must be further evaluated.

Future Trends

Researchers have developed a novel method of spraying mesenchymal stem cells on the surface of titanium and making it to differentiate into osteoblasts or bone building cells.

A titanium foam is prepared by mixing titanium powder with foaming agents. These foaming agents cause swelling of polymer when heated. Later this polymer is removed and titanium is condensed to provide strength to the porous structure. This enhances bone growth into the pores created and makes it less invasive.

When zinc and titanium are made in nano topography, it increases the surface area providing more space for bone forming cells to adhere. They also have shown to possess anti bacterial effect.

When SLA treated surface is coated with Arg–Gly–Asp (RGD), peptide-modified polymer (PLL-g-PEG/PEG–RGD) higher bone-to-implant contact is seen. These peptides act on integrins which leads to increased bonding of osteoblasts onto the implant surface.

Recombinant human Bone Morphogenic Protein (rhBMP-2) when coated on the implant surface causes regeneration of the lost surface.
Off late high energy sputter deposition, adhesive coatings, bio pore structuring, titanium zirconium alloying and nano pore structuring have been evolved by various manufacturers. They are still in infancy and further long term clinical studies are required to validate their clinical application

**Conclusion:**
From the earlier days when titanium was used for implants, it has undergone a sea of changes to improve osseointegration. Modifying the surface topography is one of the aspects in this regard. Surface of titanium has been subjected to various treatment procedures to improve its chemical composition and roughness which is favourable for bone formation. Certain procedures are additive in nature and certain procedures are subtractive in nature. This review article evaluated, critically, the different surface treatment procedures that are in vogue to modify the dental implants. The future of this concept has also been discussed.

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**Keywords:** Dental Implants, Surface treatment, topography, osseointegration.
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Keywords: Dental Implants, Surface treatment, topography, osseointegration. - Vinaya Bhat
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COMPARATIVE EVALUATION OF ANTIMICROBIAL SUSCEPTIBILITY PATTERN AND VIRULENCE FACTORS AMONG ESBL AND NON-ESBL PRODUCING ESCHERICHIA COLI

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Abstract:
Objectives: The present study was carried out to compare the antimicrobial susceptibility pattern and phenotypic characteristics in ESBL and non-ESBL producing clinically isolated E. coli.

Material and Methods: A total of 100 non-duplicate consecutive isolates of E.coli were collected from various clinical specimens obtained from K.S. Hegde Charitable Hospital, Mangalore. All the isolates were studied for antimicrobial susceptibility pattern using modified Kirby-Bauer method. ESBL production was screened phenotypically by an initial screening test, which was followed by confirmatory Double disk synergy test. These isolates were screened for virulence factors such as Biofilm assay, hemolysin production and Congo red agar to detect the invasiveness of the isolates.

Result: Out of the 100 E.coli isolates, 45(45%) isolates exhibited ESBL production. Among the ESBL producing isolates 62% were haemolytic, 77% exhibited Congo red uptake, and these two factors were statistically significant as compare non ESBL producing isolates, while 47%, 35% and 18% of the isolates exhibited high, moderate and low biofilm forming ability, respectively. The ESBL producing isolates were multi-drug resistant. There was statistical significance among the ESBL production and expression of virulence factors.

Conclusion: The present investigation revealed, a high prevalence of multiple virulence factors among the ESBL in addition to multi-drug resistance when compared with non-ESBL isolates. This indicates a dire need for effective ESBL surveillance and control in the hospitals and judicious use of antibiotics among the general public.

Keywords: Extended Spectrum beta lactamases, E.coli, Biofilm, curli fimbriae, hemolysin

Introduction:
The advances in the field of antimicrobials have not been sufficient to curb the persistently growing population of multidrug resistant bacteria. These multidrug resistant bacteria remain the major threat to public health worldwide. E.coli is one of the major forerunners in causing the nosocomial and community acquired infections. It is a commensal in the human intestinal tract. While most strains of E.coli reside harmlessly in the human colon and appear to be poorly adapted to cause disease in healthy individuals, there exist a plethora of pathotypes that can cause specific type of illness in normal hosts and those with compromised nonspecific defence mechanisms. Bacteria are endowed with certain special characters which help them in proliferation and to cause life threatening infections in humans. Pathogenic strains differ from commensal organisms in that they produce virulence factors specific for each pathotype and the term virulence refers to a quantitative measure of the pathogenicity or the likelihood of a pathogen causing infection. However, virulence factors (VFs) apply to the elements (i.e. gene products) that enable a microorganism to colonize a host niche where the organism proliferates and causes tissue
damage or systemic inflammation. Furthermore it has now come to our understanding that virulence is not a separate microbial characteristic but, rather, a complex, dynamic, and changeable phenomenon that includes both host and microbial factors.²

The infections caused by *E. coli* are intestinal infections and extra intestinal i.e. Urinary tract infections (UTIs), bacteraemia, neonatal meningitis, osteomyelitis, peritonitis, cholangitis and other soft tissue infections. In intestinal tract it causes diarrhoeal disorders which may be attributed to various toxins produced by it. Along with the numerous VFs it also has developed resistance to numerous antimicrobial agents, especially the third generation Cephalosporins, which has led to the difficulty in treating the infections caused by these multidrug resistant organisms.

Many studies have been carried out to detect the virulence factors of *E. coli*. However, very few studies have been conducted on extended spectrum beta lactamase (ESBL) and non ESBL producing isolates. Hence this study was undertaken to compare the virulence factors and antibiotic susceptibility pattern of pathogenic *E. coli* isolated from nosocomial infections.

**Material and Methods:**

A total of 100 non-duplicate isolates of *E. coli* isolated from various clinical samples of the hospitalized patients were obtained from K.S. Hegde Charitable Hospital, Mangalore. The organisms were identified based on colony morphology, Gram staining and standard biochemical tests. All the isolates were studied for antimicrobial susceptibility pattern using modified Kirby-Bauer method. ESBL production was screened phenotypically by an initial screening test, which was followed by confirmatory Double disk synergy test set by CLSI guidelines. Screening for ESBL production was done by placing Cefotaxime (30μg), Ceftazidime (30μg) and Ceftriaxone (30μg) on inoculated Mueller-Hinton agar plates and incubated for 24 hours at 37°C. When the inhibition zones of the drugs for gram negative bacteria were ≤ 27mm for Cefotaxime (30μg), ≤ 22mm for Ceftazidime (30μg), ≤ 25mm for Ceftriaxone (30μg) respectively, the strain was suspected as a potential ESBL producer. The potential ESBL isolate in *E. coli* was then confirmed using Cefotaxime (30μg), ceftazidime (30μg), alone and in combination with clavulanic acid on Muller hinton agar. The test organism was identified as an ESBL producer when the zone of inhibition of ceftazidime (30μg) or Cefotaxime (30μg) combined with inhibitor showed difference of ≥ 5mm compared with cephalosporins alone.

**Detection of Virulence Factors:**

The above *E.coli* isolates were screened for the following virulence factors.

1. **Haemolysin production:** Plate haemolysis test was done by using 5% sheep blood agar to detect alpha-haemolysin produced by *E. coli*. The bacteria was streaked on sheep blood agar and incubated over night at 35°C. Haemolysin production was be detected by the presence of a zone of complete lysis of erythrocytes around the colony.⁵

2. **Curli fimbriae:** The ability to express curli fimbriae was evaluated by streaking each isolate on modified LB-agar plates (without NaCl) containing 0.004% Congo red (CR) and 0.002% Coomassie Brilliant Blue G. CR binding was indicated by the presence of red or pink colonies after incubation overnight at 37°C.⁶

3. **Biofilm formation in microtitre plates:** The ability of the isolates to form biofilm was determined as per the protocol of Rodriguez-Bano et al.⁷ with some minor modifications. Overnight cultures were inoculated into Luria Bertani broth, diluted to 1:100 and incubated for 24 hour at 37°C without shaking. Each test was performed in triplicate in 96 well microtitre plates. Negative controls used in each plate were also included in triplicate. Biofilms were stained with crystal violet 1% (w/v) and quantified by the Universal microplate reader (Chem Well, Awareness Technology, INC.) at OD630 nm after solubilization with 33% glacial acetic acid. Isolates were classified as moderate biofilm formers if they had an OD value at least twice that of negative controls and good biofilm formers if their OD value exceeded that of negative controls by a factor of four, as suggested by
Rodriguez-Bano et al.  

Statistical analysis: The results of the study were analyzed by Mann-Whitney U Test and the level of significance was set at P<0.05.

Results:
The 100 extraintestinal *E.coli* isolates were collected from various samples such as Urine(65%), Exudates(pus, pus swab, wound aspirates)(26%), Body fluid(4%), and blood(5%).

Antimicrobial resistance was studied to the commonly used antibiotics. The 100 *E.coli* isolates studied were found to be susceptible to the carbapenems tested. Among the ESBL producing isolates high susceptibility rates were found among the Nitrofurantoin, Piperacillin Tazobactum and Co-trimoxazole. The commonly used antibiotics were found to be resistant among both ESBL as well as non ESBL groups. Among the 45 isolates in ESBL group 36 isolates exhibited multidrug resistance.

The virulence factors such as hemolysins, curli fimbriae and biofilm formation ability were investigated. The presence of the curl fimbriae(60%) was found to be the most common virulence factor among the isolates. The virulence factors were studied comparing two groups among the ESBL and non ESBL producing isolates. Our study found a statistically significant increase of the hemolysin(62%), curli fimbriae(77%), presence of multidrug resistance(80%) and multiple virulence factors(80%) among the ESBL producing isolates. Whereas, there was no statistical significance on biofilm forming ability of the isolates.

Discussion:
The ability of the organism to survive the hostile environments of the host, adhere colonise and cause disease is brought about by the hidden armamentarium of virulence factors endowed on the bacteria. Studies conducted during the early 20th century found that the organisms required the presence of specific microbial determinants which led to the view that there were intrinsic differences between pathogens and non-pathogens and the concept that disease associated microbes were endowed with certain characteristics that enabled them to cause disease. This enabled the investigators to differentiate between pathogenic and non pathogenic bacteria. Our study was an approach to understand the expression of virulence factors under the influence of antimicrobial resistance exhibited by the organism.

<table>
<thead>
<tr>
<th>Sl. no</th>
<th>Virulence Factors</th>
<th>ESBL isolates 45(45%)</th>
<th>Non ESBL isolates 55(55%)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hemolysis</td>
<td>28(62%)</td>
<td>6(11%)</td>
<td>.000</td>
</tr>
<tr>
<td>2</td>
<td>Curli assay</td>
<td>35(77%)</td>
<td>25(46%)</td>
<td>0.001</td>
</tr>
<tr>
<td>3</td>
<td>Biofilm formation</td>
<td>High</td>
<td>21(47%)</td>
<td>Not significant</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>16(35%)</td>
<td>18(33%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>8(18%)</td>
<td>9(16%)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Multidrug resistance</td>
<td>36(80%)</td>
<td>18(32%)</td>
<td>0.000</td>
</tr>
<tr>
<td>5</td>
<td>Strains exhibiting multiple virulence factors</td>
<td>36(80%)</td>
<td>22(42%)</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Table 1: Antibiotic susceptibility pattern of ESBL producing and non ESBL producing *E.coli* isolates

<table>
<thead>
<tr>
<th>Antibiotics</th>
<th>Percentage of susceptibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imipenem</td>
<td>100</td>
</tr>
<tr>
<td>Piperacillin/tazobactam</td>
<td>65</td>
</tr>
<tr>
<td>Amikacin</td>
<td>56</td>
</tr>
<tr>
<td>Chloramphenicol</td>
<td>36</td>
</tr>
<tr>
<td>Co-trimoxazole</td>
<td>60</td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>45</td>
</tr>
<tr>
<td>Ertapenem</td>
<td>100</td>
</tr>
<tr>
<td>Nitrofurantoin</td>
<td>77</td>
</tr>
<tr>
<td>Cefazidime</td>
<td>0</td>
</tr>
<tr>
<td>Ceftriaxone</td>
<td>32</td>
</tr>
<tr>
<td>Ceftaxime</td>
<td>30</td>
</tr>
<tr>
<td>Gentamycin</td>
<td>52</td>
</tr>
</tbody>
</table>

Table 2: Comparison of virulence factors among ESBL and non ESBL producing *E.coli* isolates

Keywords: Extended Spectrum beta lactamases, *E.coli*, Biofilm, curli fimbriae, hemolysin - A. Veena Shetty
Antibiotic susceptibility studies brought to light the higher resistance among the commonly used antibiotics. Along with third generation cephalosporins, amikacin and Chloramphenicol exhibited higher resistance to the antibiotics tested. The greater prevalence of resistance to common antibiotics may be due to the excessive use and misuse by the healthcare personnel. Similar trend has been reported by different group of investigators. Our study indicated a high rate of ESBL production by E. coli which may be due to the selective pressure imposed by extensive use of antimicrobials. The indiscriminate use and misuse of cephalosporins is responsible for the high rate of selection of ESBL producing microorganisms. These results are consistent with previous studies from India. This trend can be only managed by constant and consistent screening and surveillance of the isolates.

Our study brought to light that the ESBL producing strains expressed virulence factors significantly higher than the non ESBL isolates. We studied the adhesive property of the organism by fimbrial adhesins such as curli fimbriae. These are one among the numerous adhesins possessed by the organism. It is a known fact that the adhesins are the first line of virulence factors which help the organism to colonise the host and establish itself. E. coli cells associated with a surface generally clump together to form microcolonies or biofilm in order to maximize metabolic breakdown and stress management. The bacterial interaction with a surface is a two-stage process. Bacterial cells can easily be removed from the surface during the first phase. In the second phase bacterial association with the surface becomes irreversible. The formation of biofilm is seen during this phase as the cells multiply and produce polysaccharide. E. coli produce a long, thin and wiry surface fibre known as curli and polysaccharide. Curli plays an important role in the adhesion of E. coli to its contact hosts. There is specific interaction with host matrix proteins such as fibronectin, laminin and plasminogen to initiate adherence and colonization in the host. Prior research suggests that curli may also play a role in the development of biofilm on inert surfaces. The curli-expressing cells form red, while noncurli-expressing cells form colourless colonies on the indicator agar.

We found that expression of curli fimbriae was seen 77% in ESBL producing isolates as compared to 46% non-ESBL producing isolates. The difference was statistically significant in the ESBL group. The production of Curli fimbriae and the coexistence of ESBL production has not been undertaken earlier to discuss in detail. Curli fimbriae has been associated with virulence and pathogenicity among several bacterial species including E. coli causing avian septicaemia and UPEC strains. But our study reveals the fact that the antimicrobial resistance confers additional resistance abilities to the organism. The biofilm production has been of major concern since its discovery on medical catheters and implants. A structured consortium consisting of bacterial DNA, polysaccharide and protein is a biofilm. Bacterial biofilms have known to cause chronic illness in the medical setting resulting in increased resistance to the antimicrobial agents and disinfectants used in the medical world. We studied the biofilm formation of the isolates on microtitreplate method as described by Rodriguez Bano et al. We also made an effort to semiquantitate the biofilm formation by identifying the isolates forming High, moderate and low biofilm forming isolates. In our study we found that biofilm forming ability of ESBL and Non ESBL were not statistically significant but both were fairly positive to form biofilms. It is also noteworthy that Non ESBL forming organisms were not far behind in forming biofilms. It has been noted that catheters and other medical devices colonization and biofilm formation occurs in many patients undergoing invasive treatment, from a very early stage. Hence the detection of the biofilm on medical catheters and its proper treatment is necessary to minimize the colonization and infection by the pathogens.

Production of cytotoxic toxins is common phenomenon among the pathogenic bacteria. The more severe form of E.coli infections are usually associated with hemolysin production by the organism. Hemolysins are known to have...
numerous effects on host tissues including inflammation, tissue injury and impaired host defenses. Hemolysin production among isolates during our investigation showed significantly higher presence among the ESBL isolates confirming that multi drug resistance contributes to higher expression of virulence factors. A recent study also found significant percentage of hemolysin production among the multi drug resistant E.coli.

The drug resistance is on an alarming rise. The resistance may provide a substantial advantage to the survival of the pathogen in the host resulting in increased morbidity and mortality. Therefore appropriate empirical therapy and judicious use of the antibiotics is a necessary requisite to prevent the resistance among the pathogens. In the present study, ESBL producing E.coli isolates had strong positive correlation with multiple virulence factors. Hence, we feel that multidrug resistance will positively affect the expression of virulence factors. Therefore, the continuous screening of E.coli for the antimicrobial resistance is of utmost importance.

References:
A STUDY OF FOOTPRINTS OF TREE-CLIMBING COMMUNITIES OF SOUTH INDIA

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Abstract:
The paper details the morphological adaptations of the foot shape and its arches to sustained professional tree climbing activity. Foot inversion, as required by climbers on a long term and regular basis reshapes the bony architecture of the foot and the medial longitudinal arch over a period of time. These changes can be observed and measured, noninvasively through study of footprints. This community study on the progressive adaptation of the arch to the rigors of climbing was recorded through footprints collected from the climbers with varied experience in the profession. The collation of observations show that the medial arch continues to shrink with sustained inversion, raising the dome of the instep.

The progressive compensatory rise in arch height however, is arrested abruptly after a phase, with failure of the arch to accommodate further to more stress – leading to slipping and falls from heights. The article discusses the bio-mechanisms and kinetics of foot adaptation to the rigors of climbers and analysis the cause of accidental falls, even though most of the accidental fall victims have had a number of years of climbing experience.

Keywords: medial longitudinal arch, foot, coconut palm, community, inversion

Introduction:
The human foot, though designed to bear weight and facilitate bipedal locomotion also shows the combined effects of heredity and acquired lifestyle. Adaptation in shape and modifications in soft tissue and osteological components of the foot to large extent are dictated by kinetic stresses and strains it is subject to. Functional biomechanics play a visually verifiable and metrically quantifiable anatomical remodeling of foot structure.

The role of foot arches in aiding the early of biped to adapt to a terrestrial existence is a landmark milestone in development of the hominid. The ligaments, joints, bones, muscles and soft tissue components of the foot, contribute in their own unique ways in making man, the only one among his mammalian cousins, to have mastered the art of walking on hind limbs as units. The question raised here is, are these time honored evolutionary anatomical features of the foot absolute? Can prolonged and sustained strain induced by specific usages such as in tree climbing, influence the foot structure to revert to its simian prototype? Are these changes, if any, measurable?

The footprint is a unique record of the weight bearing status. The print impress itself is a metrically assessable permanent database. Evaluation of the hemi-dome (hollowness) produced by the medial edge of the human foot, essentially the measurements of the components of the medial longitudinal arch should present us with data which can be compared and analyzed. In this paper we present our findings on the evaluation of both feet of a hundred adult males from local communities that practice tree-climbing. The results are compared with those collated from measurements in lay population of males

Material & Methods
Footprints of both feet were recorded on graph sheets,
using ink pads as staining medium (Fig. 1 & 2) Adult males from Thiyya, Idiga, Billava and Namdhari communities of three contiguous districts of the southwest coast of India formed the nidus for this study. The horizontal length, breadth and surface area of the hollow semilunar space in the prints were measured using Meyer’s line as reference. The height of the medial arch was measured as a perpendicular drawn from the tuberosity of the navicular to the horizontal (Fig.3). The study was conducted across communities spread across three contiguous south India states (Tamilnadu, Kerala and Karnataka).

Tabulations and graphical records for visually identifiable gross changes and adaptations were prepared. The control group consisted of adult males drawn at random from similar age range. Field observations of the plantation industry, of palmyrah (toddy), areca and coconut were made to note the techniques of tree climbing used by professionals. The results were subject to statistical analysis and evaluation. None of the volunteers for this project was subject to any hospital-based investigation or invasive procedure. Visual observations on external features of feet in professionals were also made.

Results & Observations
The metrical values of both feet in tree climbers of varied ages and years of experience in occupation, along with the values of the control group are shown in Tables I to IV. The measurements show an average of 88.63 mms, 39.95 mms, 53.03 mms and 2538 sq mms for left side (length, breadth, height and surface area). In controls the same parameters showed 70.14 mms, 27.34 mms, 49.7 mms and 1345 sq mms for left and 72.2, 27.4, 49.81 and 1391.89 sq mms for right foot.

There is an obvious increase in all parameters, length, breadth, height and surface area in climbers compared to controls. It is also noted that the increase is directly proportional to the number of years of practice of the profession. However, oddly, the increase - trend gets arrested with the climbers attaining about 3 decades experience in profession, in fact, there is an overall dip in all dimensions thereafter. The decrease is seen in length, breadth and increase in arch height.

Visual observations showed both feet in most climbers, especially those with a number of years of adherence to profession, had ‘in-situ’ partial inversion of foot. The hallux itself was invariably separated wide from the fellow toes (hallux valgus). Calcaneovarus and adduction deformation of both feet were also seen. Callosities were found pressure spots on plantar surface and on the medial edge dermal changes could be not just due to the stresses transmitted by climbing, but also to the friction and tribadic pressures brought about by rapid descent from the tree tops.

The results of statistical analysis of data using students unpaired ‘t’ test reveals that the 'P' value is highly significant in the parameters of length, breadth and surface area for both feet. The P value for arch height is significant for left foot, and highly significant for the right (Table V & VI).

Discussion
The tree-climbing activity is traditionally carried out by isolated communities, the men-folk adept in the art of tree climbing. The communities engaged in this professional calling are the Idiga, Thiyya Namdhari and Billava. The trees

| Table I: mean of age of normal and tree-climbers with mean of experience |
|---------------------------|------------------|-----------------|
| Normal (age)              | Mean             | Std. Error of Mean |
| 40.74                     | 0.51             |
| Tree Climbers (age)       | 42.92            | 1.11             |
| Experience(Tree climbers) | 20.14            | 1.15             |

| Table II : mean of age parameters of left & right foot in normal & tree-climbers (with Standard Error of Mean) |
|---------------------------------------------------------------|-------------------|-------------------|
| Normal                                                       | Left              | Right             |
|                                                              | Mean             | Std. Error of Mean | Mean             | Std. Error of Mean |
| A. Length                                                    | 70.14±            | 2.08              | 72.20            | 2.71              |
| B. Breadth                                                  | 27.34             | 1.28              | 27.40            | 1.19              |
| C. Height                                                   | 49.70             | 1.19              | 49.81            | 1.26              |
| D. Surface Area                                             | 1345.06           | 98.26             | 1391.00          | 99.88             |
| Tree Climbers                                               | A. Length         | 88.63             | 1.19             | 89.00            | 1.15              |
|                                                            | B. Breadth        | 39.95             | 1.00             | 39.02            | 0.74              |
|                                                            | C. Height         | 53.03             | 0.69             | 53.29            | 0.64              |
|                                                            | D. Surface Area   | 2538.82           | 84.28            | 2587.97          | 76.20              |

Keywords : medial longitudinal arch, foot, coconut palm, community, inversion - Arunachalam Kumar
are scaled through a series of upward hops along the vertical face of the trunk, the exercise calling for flexion, abduction extension and lateral rotation of hip, flexion extension at knee, plantar and dorsiflexion at ankle, inversion at the subtalar articulations and flexion at metatarsophalangeal and interphalangeal joints of the foot. To assist leverage, a 'rattan' loop is worn around the waist, which in turn is wound around the tree trunk. A similar loop worn across the ankles prevents the splaying of

![Fig. 1: Footprints of normal adult male](image1)

![Fig. 2: Footprints of tree-climber with 10-20 years experience](image2)
feet, keeping them approximated to the trunk surface at all times of ascent or descent. The climb induces tremendous gravitational strain on the tibiotalar and intertarsal joints. Each professional climber works around 4 hours a day and scales 25-30 trees.

The percentages of the people who had fallen from coconut trees and had faced injuries in the different experience groups were with less than 10 year of experience 15%, in 11-20 years of experience, 26.6%, in 21-30 years of experience it was 44% and in those with 30 years of experience the value was 41.3%. A total of 35.5% (78 cases out of 220 climbers) fell down from coconut trees while doing their job.

The results of this study show that with sustained and prolonged strain the foot undergoes permanent and quantifiable shape change. The forced inversion, abuts on the osteo-myo-fascial bow of the medial longitudinal arch which over time, shows an increase in length, breadth, surface area and height. These changes through quite rapid in the first few years of climbing, level off in the second decade of engagement, after which the dimensions once again show a spurt in all parameters. However, after three decades of climbing, the percentage values of increase drops for length, breadth and surface area, but continues to rise for the height of arch.

It is our inference that the foot dynamics and kinesiological exertions strain the factors maintaining the medial arch, the stress being overcome through a generalized augmentation in size and strength through intrinsic physiological compensatory counteractions. The failure of compensatory changes, with age and exposure (beyond 3 decades) leads to an arrest of these mechanisms, which now show a reduction in dimensions (and probably strength too.) The continued increase in arch height is mainly due to permanency of osteological changes in the foot architecture. The probable development of pressure induced epiphysis or bony spurs or buttresses in the tarsi through usage make the morphological adaptations in these bones permanent. The medial arch in experienced tree climbers is raised, not so much through fascial inputs, but remains so by the rigidity of the deformed bony arch base.

It is also interesting to note that, accidental falls and fatalities that are recorded from time to time from groves, usually involve very experienced and old climbers. The percentages of the people who had fallen from coconut trees and had faced injuries in the different experience, in those with 10 year of experience it was 15%, in those with 11-20 years of experience it was 26.6%, in those with 21-30 years of experience, it stood at 44% and in those with more years it was 41.3%.

Table V: Students unpaired ‘t’ test for equality of means

<table>
<thead>
<tr>
<th></th>
<th>'t' test for Equality of Means</th>
<th>Inference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>t</td>
<td>Sig.2 tailed</td>
</tr>
<tr>
<td>Left A. Length</td>
<td>-2.597</td>
<td>0.011</td>
</tr>
<tr>
<td>B. Breadth</td>
<td>-3.047</td>
<td>0.003</td>
</tr>
<tr>
<td>C. Height</td>
<td>-1.435</td>
<td>0.154</td>
</tr>
<tr>
<td>D. Surface Area</td>
<td>-2.055</td>
<td>0.043</td>
</tr>
<tr>
<td>Right A. Length</td>
<td>-2.234</td>
<td>0.028</td>
</tr>
<tr>
<td>B. Breadth</td>
<td>-2.740</td>
<td>0.007</td>
</tr>
<tr>
<td>C. Height</td>
<td>-0.681</td>
<td>0.498</td>
</tr>
<tr>
<td>D. Surface Area</td>
<td>-2.609</td>
<td>0.009</td>
</tr>
</tbody>
</table>

Fig: 3: Showing increase in length (A) and surface area (D) in climbers compared to normals.
than group 30 years of experience it was 41.3%. A total of 35.5 % (78 cases out of 220 climbers) fell down from coconut trees while doing their job. The mystery of why an experienced and highly skilled laborer should slip may now be explained through our observations that, there is abrupt cessation in progressive arch adaptation and functional efficiency after 30 years climbing. The bony arch alone, now divested of its resilience provided by arch-sustaining ligaments, is unable to sustain the stress and weight of the aged climbers 11.

It is hoped that anthropometric studies such as this one may serve to build up retrievable records of the anatomical and functional dynamics of the physical attributes of communities of ‘dying’ professions such as tree-climbing12,13.

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10. George BM, Muddanna SR, Arunachalam Kumar, Niveditha S, JS D'Souza , 2012, Health of coconut tree climbers of rural south India - Medical emergencies, body mass index and occupational marks- a quantitative and survey study; Journal of Diagnostic and Clinical Research Vol.6 (1) pp 57-60
11. Bhat PS & Arunachalam Kumar, The medial longitudinal arch in tree climbing communities, Scientific Medicine 1(2) 2009
SLEEP DURATION AND SLEEP HYGIENE PRACTICES IN ADOLESCENTS: AGE AND GENDER DIFFERENCES

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Abstract:
Aim: The study aims at assessing the sleep hygiene practices among Indian adolescents and to identify the age and gender influence on sleep duration and sleep hygiene practices.

Methods: The data was drawn from a part of pilot study conducted among adolescents from sixth to 12th grade in India as a part of doctoral research. A stratified random sampling method was used. A total of 58 adolescents, 29 males and 29 females participated in the study. Data was collected using two questionnaires, one for the general demographic data with a part on sleep duration and the second for estimating the sleep hygiene practices.

Results: The adolescents slept on an average of 7.68±.99 h during school days, and 8.70±1.63 h on weekends. Middle adolescents slept less than early adolescents. Gender showed no significance with sleep duration, since p-values were >.05 level of significance. The mean sleep hygiene index scores were 28.59 ±6.71. Even though the sleep hygiene scores of males were slightly better than females, it was not statistically significant.

Conclusion: Adolescents in the study obtained less than recommended hours of sleep for their age on school days. Sleep hygiene practices were moderately poor among adolescents. Emphasizing good sleep hygiene practices, and integrating sleep promotion programs into daily routines should be considered to improve the sleep problems in adolescents.

Keywords: Sleep, Gender, Sleep Hygiene, Adolescents, Sleep duration

Introduction:
Adolescent period is a characteristic time with many changes in sleep-patterns, as shown in many studies. These alterations are attributed to puberty, biological and homeostatic changes in the circadian and sleep/wake systems, as well as environmental factors influencing life style of adolescents. Adolescents increasingly suffer from insufficient sleep and excessive daytime sleepiness. It is estimated that adolescents requires 9.2 hours of sleep across all pubertal stages, and the sleep need is not reduced during adolescence. But studies show that approximately 45% and 85% of sixth to 12th-grade students report sleeping less than the recommended amount on school nights, and 44% of students report difficulty staying awake during school. In another study in Japan, the high school students were reported to be getting only 6.3 hours of nocturnal sleep as attributed to their life style.

Sleep is essential for optimizing physical, cognitive and emotional functioning and for maintaining good quality of life. Sleep deprivation, or obtaining less than recommended hours of sleep is found to impair adolescents’ ability in learning and academic success as well as it leads to problems in emotional regulation resulting in increased stress, changes in mood, decreased motivation and behavioral and emotional problems.

In a prospective study during 3 years done by Shochat, on 2000 young adolescents in age group of 11-14 years, it was found that shorter sleep increase the risk of depressive symptoms and low self-esteem both concurrently and over time. Poor perceived mental health and low life satisfaction with insomnia is also reported due to lack of sleep.
Studies on sleep patterns of adolescents based on gender and age shows inconsistent results. Many studies did not find gender differences. \(^{10,11}\) Whereas in some studies, girls reported to wake up earlier on weekdays but later on weekends. In another study, girls found to wake up earlier on weekdays, and with same sleep length as boys, found to accumulate higher sleep debt resulting in delayed wake up times on weekends than boys. \(^{12}\) The variability in these results could be due to the differences in measurement of sleep time or in the age of participants in the study. \(^{13}\)

Sleep hygiene is the practice of several behaviors that optimize and promote good sleep and daytime functioning. Ensuring regular bedtimes and rise times, limiting napping during the day, having a relaxing sleep schedule, avoiding stimulants before bedtime and ensuring a favorable sleeping environment are parts of promoting good sleep hygiene behaviors. \(^{7}\) The quality of sleep in children is affected by the level of sleep hygiene practices. \(^{14}\) Poor sleep quality along with insufficient sleep is found to affect academic performance. \(^{15}\) The primary aim of this study was to assess the sleep hygiene practices among Indian adolescents and to identify the age and gender influence on sleep duration and sleep hygiene practices.

**Methods:**
The present study data was drawn from a part of pilot study conducted among adolescents from sixth to 12\(^{th}\) grade in India as a part of doctoral research. Participants were studying in various schools in Mangalore, and were aged between 11-17 years. Three schools which were randomly selected participated in the study. A total of 58 students, 29 male adolescents and 29 female adolescents, selected using a stratified random sampling method, were included in the study. Gender was used as a criterion for stratification. Institutional Ethical Committee approval was obtained to conduct the study. Once the schools' permission was received, parental consent for the adolescent’s to take part in the study and child’s assent to voluntarily participate in the study was taken. The data was collected during the months of July and August 2013. Questionnaires were distributed to adolescents during school hours and collected back on the same day. Two questionnaires were used: one consisted of questions related to adolescents’ basic information such as age, grade in school, gender, and a part related to sleep duration, i.e., hours slept during a typical school day and weekend and the second assessed the sleep hygiene behaviors using Sleep Hygiene Index developed by Mastin, Bryson and Corwyn, 2006. \(^{16}\) This questionnaire consists of 13 items, on a five point Likert scale (Never =1, rarely = 2, sometimes= 3, frequently= 4, always= 5). Items scores were summed providing a global assessment of sleep hygiene. The scores ranged from 13-65, higher scores indicative of more maladaptive sleep status. The Cronbach’s a of the scale is 0.66 with a good test- retest reliability (r=0.71). Permission was obtained for using the scale in the study.

**Results:**
A total of 58 adolescents participated in the study. Equal number of boys and girls, i.e., 29 each were included. Adolescents were aged between 11-17 years (mean age 14.02). When classified according to groups (adolescent classification by American Academy of Pediatrics) of early and middle adolescents (Table 1), 31 of them were in early adolescent age group (11-14 years) and 27 of them were in middle adolescent age group (15-17 years).

**Sleep Duration on weekdays and weekends among adolescents**
The adolescents slept on an average of 7.68±.99 h during school days, and 8.70±1.63 h on weekends. This shows that they are not obtaining the recommended hours of sleep for their age group on week days, and was compensated by sleeping extra hours on weekends (Table 2). Middle adolescents were affected more than early adolescents. The sleep duration of early and middle adolescents during weekdays and weekends were compared using Mann-Whitney test. A highly significant difference in the average sleep of early adolescents and middle adolescents was found, in favor of early adolescents since all the p-values were less than .05 significance level.
A gender-wise comparison of sleep was carried out for school day and weekends for the hours of sleep. The results showed that there is no significant difference between males and females in average sleep on school days and weekends, since the p-values are > .05 level of significance.

Sleep Hygiene Practices

The mean sleep hygiene index scores were 28.59 ±6.71 (28.71±6.44 in the experimental group and 28.42± 7.21 in the control group). A gender-wise distribution of sleep hygiene scores showed that the mean sleep hygiene scores for males were slightly better than females (26.93± 6.82 vs. 30.24± 6.28). However, it was not statistically significant, since the p-value .079 was > .05 level of significance (Table 4).

Table 1: Classification of adolescents

<table>
<thead>
<tr>
<th>Age (in years)</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early adolescents</td>
<td>31</td>
<td>53.4%</td>
</tr>
<tr>
<td>Middle adolescents</td>
<td>27</td>
<td>46.6%</td>
</tr>
<tr>
<td>Total</td>
<td>58</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Table 2: Average Sleep Duration and Age of Adolescents

<table>
<thead>
<tr>
<th>How much sleep do you get on an average during a school day? (hours/day)</th>
<th>Mean</th>
<th>SD</th>
<th>Mean</th>
<th>SD</th>
<th>Mean</th>
<th>SD</th>
<th>P-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early adolescents</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How much sleep do you get on an average during a school day? (hours/day)</td>
<td>8.06</td>
<td>0.97</td>
<td>7.24</td>
<td>0.84</td>
<td>7.68</td>
<td>0.99</td>
<td>0.001</td>
</tr>
<tr>
<td>How much sleep do you get on an average during a week end? (hours/day)</td>
<td>9.35</td>
<td>1.65</td>
<td>7.94</td>
<td>1.25</td>
<td>8.70</td>
<td>1.63</td>
<td>0.001</td>
</tr>
<tr>
<td>Overall average sleep</td>
<td>8.71</td>
<td>1.07</td>
<td>7.59</td>
<td>0.87</td>
<td>8.19</td>
<td>1.12</td>
<td>&lt; 0.001</td>
</tr>
</tbody>
</table>

* p<.05 level of significance

Table 3: Average Sleep Duration & Gender Distribution of Adolescents

<table>
<thead>
<tr>
<th>How much sleep do you get on an average during a school day? (hours/day)</th>
<th>Male</th>
<th>SD</th>
<th>Female</th>
<th>SD</th>
<th>Total</th>
<th>SD</th>
<th>P-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early adolescents</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How much sleep do you get on an average during a school day? (hours/day)</td>
<td>7.48</td>
<td>1.01</td>
<td>7.88</td>
<td>0.95</td>
<td>7.68</td>
<td>0.99</td>
<td>0.177</td>
</tr>
<tr>
<td>How much sleep do you get on an average during a week end? (hours/day)</td>
<td>8.95</td>
<td>1.65</td>
<td>8.45</td>
<td>1.60</td>
<td>8.70</td>
<td>1.63</td>
<td>0.232</td>
</tr>
<tr>
<td>Average sleep</td>
<td>8.22</td>
<td>1.12</td>
<td>8.16</td>
<td>1.15</td>
<td>8.19</td>
<td>1.12</td>
<td>0.797</td>
</tr>
</tbody>
</table>

* p<.05 level of significance

Table 4: Gender and Sleep Hygiene Scores of Adolescents

<table>
<thead>
<tr>
<th>Sex</th>
<th>Sleep Hygiene Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Minimum</td>
</tr>
<tr>
<td>Male</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td></td>
</tr>
</tbody>
</table>

Mann Whitney P-value* 0.079

* p<.05 level of significance

Discussion:

Sleep loss in adolescents, either by societal changes due to lifestyle choice, or due to academic pressures are becoming increasingly common in our modern society. Insufficient sleep can result in excessive daytime sleepiness and therefore lead to problems which affects adolescent’s health and cognitive functioning. 

But in spite of increasing prevalence and negative consequences, the awareness and appreciation of sleep and health issues among the general public and health professionals are extremely limited. The present study investigated the sleep duration and sleep hygiene practices and assessed its gender-wise differences among Indian adolescents. Adolescents in this study obtained 48.6 min less than the...
recommended 9 h of sleep, i.e., only 8.19 h of sleep. But during school days, they slept much less, i.e., 7.68 h. This made them sleepy over the weekends, indicating a marked sleep debt. The results were similar to other studies, in which adolescents slept for more hours to compensate for their lost sleep. Girls slept slightly more than boys on school days (7.88 ± .95 vs. 7.48 ± 1.01). It was similar to the study results obtained by Moore, were girls slept 22.14 min more than boys. However, gender was not statistically significant in the present study. Sleep duration and age showed similar results with the study by Mateo, where bedtimes were later with increasing age and sleep length decreased with increasing age. The adolescents in the present study reported moderately poor sleep hygiene practices.

The magnitude of the sleep problems among adolescents is an important concern in their development and emotional well-being. Delayed circadian timings occur with puberty, and in combination with minimal parental influence and environmental factors results in development of improper sleep schedules and poor sleep habits. Emphasizing good sleep hygiene practices, and integrating sleep promotion programs into daily routines should be considered to improve the sleep problems in adolescents.

Acknowledgements:
The author would like to thank Mr. Hassan Al Basri, Senior Lecturer, Statistics department, College of Health Sciences, University of Bahrain for the statistical support given in this study.

References:

Keywords: Sleep, Gender, Sleep Hygiene, Adolescents, Sleep duration - Bindu John
PREVALENCE OF ORAL MUCOSAL LESIONS AND THEIR CO-RELATION TO HABITS IN PATIENTS VISITING A DENTAL SCHOOL OF SOUTH KARNATAKA: A CROSS SECTIONAL SURVEY- 2012

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Abstract:
The aim of the present study was to determine the prevalence of oral mucosal lesions and their co-relation to deleterious habits of smoking, tobacco and alcohol consumption. 2000 patients visiting both rural and urban centres were screened for oral lesions and information regarding habits was obtained through a questionnaire. The results showed the prevalence of oral mucosal lesion to be 16.7% in the study population. The most frequent observation was the presence of Fordyce’s spots(6.2%) followed by smoker’s palate(5.6%), leukoedema(3.15%), leukoplakia(2.1%), oral sumucous fibrosis(2%), recurrent aphthous ulcers and lingual varices(1.6%), Lichen planus(1.2%) and oral candidiasis(1%). The habits were found to be associated with increased prevalence of oral mucosal lesions, especially in men. The study concluded the need for formulation of public health programmes discouraging these practises and public awareness of their ill-effects.

Keywords: oral mucosal lesions, prevalence, habits

Introduction:
Oral malignancies collectively form the sixth most common type of cancer in the world. The Indian subcontinent has long been regarded as the epicentre of oral cancer around the globe and is recognised as a major health problem. It imposes a huge burden in terms of diagnosis, survival and the use of already stretched out health care facilities in the course of treatment.

Epidemiological studies help in determining the incidence, prevalence and the severity of diseases. They also help in assessing the distribution, the risk factors and associated aetiology. This information is useful in the formulation of health care programmes at the primary level to spread awareness, help guide in early diagnosis and lead to prompt treatment.

Dental professionals, in recent times, have become increasingly aware of the significance of oral mucosal lesions and the documented inclination of ‘potentially malignant lesions’ to lead to cancer. Tobacco and alcohol have long been recognised as risk factors in the development of oral malignancies. Thus this paper aims to evaluate the prevalence of oral mucosal lesions in South Karnataka district and to correlate the findings with habits of consuming tobacco and alcohol in the population.

Materials And Methods:
Two thousand patients were examined under the study. These patients included those who came seeking treatment for dental problems at the outpatient department of A. B. Shetty Memorial Institute of Dental Sciences and at the rural centres instituted by Nitte University at Bailoor, Mundkur and Nitte from 1st June to 31st August 2012. These patients were divided into four groups- less than 20 years of age, 20-40, 41-60 and more than 60 years. Clinical examination of the patients was done by two trained dental surgeons using artificial light, mouth mirror and gauze. Kappa test done to assess
Interexaminer reliability was 80-85% resulting in high agreement amongst the two examiners. Diagnosis was made on the basis of history, clinical examination and standard accepted guidelines. Information regarding habits of smoking, tobacco and alcohol consumption was gathered through questionnaire based interviews.

Excluded from the study were those patients who had limited mouth opening, those patients who had recent maxillofacial trauma, those who had intermaxillary fixation and unconscious patients.

The data was analysed using Statistical Package for Social Sciences (SPSS-16 version). Chi-square test was used to determine the association between different variables.

Results:
Profile of the study population:
Out of the two thousand patients, 960 belonged to the rural strata while 1040 patients were from the urban population. Males formed 55.6% of the study population and 44.4% were females. 9.40% of the participants were under 20 years of age group. Majority of the subjects belonged to the 20-40 age group, being 63%. The 41-60 age group included 25% of the subjects and the least percentage of study population was in the more than 60 years age group, which was 2.70%. Males outnumbered females in all the age groups under the study.

<table>
<thead>
<tr>
<th>Age group (years)</th>
<th>Males (n %)</th>
<th>Females (n %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;20</td>
<td>102</td>
<td>86</td>
</tr>
<tr>
<td>20-40</td>
<td>712</td>
<td>546</td>
</tr>
<tr>
<td>41-60</td>
<td>248</td>
<td>252</td>
</tr>
<tr>
<td>&gt;60</td>
<td>50</td>
<td>4</td>
</tr>
</tbody>
</table>

Prevalence of habits:
The prevalence of habits such as smoking, tobacco chewing and consumption of alcohol was 16%, 10% and 4.5% respectively. The habit of smoking was most prevalent in the 20-40 age group (16.85%) with a higher prevalence in men (28.23%) than women (0.78%). Majority of the participants smoked cigarettes (77.57%) and 235 of the total 321 people who smoked belonged to the urban population (73.2%). The habit of alcohol consumption was seen more in men (7.64%) as compared to women (0.56%) and found highest in the 20-40 age group (5.4%).

Males (16%) had a higher tendency to chew tobacco against women (3.15%) and this habit was observed most in the older age group of 41-60 (18.6%). The study found that the participants were more likely to consume paan masala or gutkha than other forms such as betel nut betel quid, etc. This habit of chewing tobacco was the most prevalent one in females as compared to smoking and drinking alcohol. In males, the habit of smoking was the most prevalent than tobacco or alcohol consumption.

Prevalence of habits according to age and gender:

<table>
<thead>
<tr>
<th>Age group</th>
<th>smoking males</th>
<th>chewing tobacco males</th>
<th>chewing tobacco females</th>
<th>alcohol drinking males</th>
<th>alcohol drinking females</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;20</td>
<td>26</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>20-40</td>
<td>205</td>
<td>7</td>
<td>37</td>
<td>0</td>
<td>18</td>
</tr>
<tr>
<td>41-60</td>
<td>32</td>
<td>0</td>
<td>71</td>
<td>22</td>
<td>63</td>
</tr>
<tr>
<td>&gt;60</td>
<td>44</td>
<td>0</td>
<td>59</td>
<td>6</td>
<td>4</td>
</tr>
</tbody>
</table>

Prevalence of lesions:
The oral soft tissue lesions were found to have a prevalence of 16.7% in the study population. They formed 334 subjects of the study population. Normal mucosal variants were seen in 256 people in the study. The most common mucosal lesion observed was smoker’s palate. It was diagnosed in 112 cases, all of which were seen in men.

The prevalence of leukoplakia was 2.1% in our population. It was found to be most commonly present in the 20-40 year age group. Males showed a higher prevalence (3.41%) as compared to females (0.45%). Oral submucous fibrosis was seen in 2% of the population with highest prevalence observed in 41-60 age group. It was more frequently found in men (2.96%) than women (0.78%).

Lichen planus was found to be 1.2% in our study. Females (2.25%) had a higher predilection for this disease than males (0.35%). This disease was mostly seen in the 20-40 age group. The prevalence of candidiasis was observed to be 1% in our study population. It was seen more in men (1.3%) than women (0.56%) and most frequently in the 41-60 age group. Recurrent aphthae were present in 1.6% of the population. Mostly seen in the 20-40 age group, it had a higher preponderance in males (1.97%) than females (1.7%).

Keywords: oral mucosal lesions, prevalence, habits - Radhika Jain
A total of 256 normal mucosal variants were recorded in 2000 patients. Fordyce’s spots in 71 males (6.38%) and 53 females (5.96%). Lingual varices were seen in 26 (2.33%) males with the highest incidence in the 60–69 years age group and in 6 females (0.67%) with highest incidence in the group aged 60–64 years. Leukoedema was reported in 54 male (4.85%) patients with peak incidence in those aged 40–44 years, and 9 female (1.01%) patients with the most in those who are 35–39 and 60–64 years.

Prevalence of lesions:

<table>
<thead>
<tr>
<th>Mucosal findings</th>
<th>Males (n %)</th>
<th>Females (n %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leukoplakia</td>
<td>38(3.41)</td>
<td>4(0.45)</td>
</tr>
<tr>
<td>Oral submucous fibrosis</td>
<td>33(2.96)</td>
<td>7(0.78)</td>
</tr>
<tr>
<td>Lichen planus</td>
<td>20(2.25)</td>
<td>4(0.35)</td>
</tr>
<tr>
<td>Oral candidiasis</td>
<td>15(1.3)</td>
<td>5(0.56)</td>
</tr>
<tr>
<td>Recurrent aphthous ulcers</td>
<td>22(1.97)</td>
<td>10(1.1)</td>
</tr>
<tr>
<td>Fordyce’s spots</td>
<td>71(6.38)</td>
<td>53(5.96)</td>
</tr>
<tr>
<td>Lingual varices</td>
<td>26(2.33)</td>
<td>6(0.67)</td>
</tr>
<tr>
<td>Luukoedema</td>
<td>54(4.85)</td>
<td>9(1.01)</td>
</tr>
<tr>
<td>Smoker’s palate</td>
<td>112(5.6%)</td>
<td></td>
</tr>
</tbody>
</table>

Discussion:

Cross sectional studies are the tools used to determine the prevalence of diseases in a population and to identify the groups which are at high risk.

The prevalence of leukoplakia was 2.1% in our study which is more than that reported by Matthew et al in Manipal. These findings were also consistent with those of Bhatnagar et al(2.38) in Uttar Pradesh, India(2013) and Espinoza in Chile(2003). However, a very high prevalence was reported by Oakley et al (13%) in the habitual areca nut chewer high-school students of Micronesia and by Zhang et al(9.18%) in China. As with other studies, our study also shows an association between smoking habits and leukoplakia. The results were statistically significant ($\chi^2 = 42.02, p<0.001$). Also, oral leukoplakia was found to be more prevalent in men than women. This could be due to the very high number of male smokers as compared to females. Leukoplakia was most commonly found on the buccal mucosa followed by the labial mucosa and the commissural area. It was also seen in the retromolar region and alveolar ridge.

The prevalence of oral submucous fibrosis found to be 2% in our population was less as compared to that observed by Sharma et al (3.39%) in the rural areas of Jaipur. This could be due to the high number of participants in that study consuming areca nut and gutkha. The relation of consuming these substances with the increased prevalence of OSMF is reinforced by our study (odds ratio= 93.66, ?² = 277.84, p<0.001). The signs seen were generalised blanching, presence of fibrotic bands in the oral mucosa and the patients’ complained of burning sensation. Oral submucous fibrosis was mostly seen in the 41-60 age groups which could be attributed to the habit of chewing pan and gutkha prevailing in this age group.

Lichen planus has an overall prevalence of 1.5% amongst Indians which was comparable to that found in our study. This was in accordance with the prevalence reported by Axell & Rundquist. This study found no significant correlation between tobacco consumption and Lichen planus (odds ratio= 1.7, ?² = 1.07) although the prevalence was higher in subjects with habits. The consumption of tobacco has the potential to alter the course of disease and should not be overlooked. The buccal mucosa was the most common site to be afflicted by Lichen planus in our study with reticular type being the most common variant present.

The prevalence of oral Candidiasis in our population is lower in our population as compared to that in South Brazil documented by Carrard V et al(14%). Also these lesions were found to be significantly associated with female gender as opposed to that observed in the current study.

The most common type recorded in our study was the psuedomembranous candidasis. The higher prevalence of candidiasis in older age group in our study reaffirms extremes of age as a risk factor for oral candidiasis due to decreased immunity and the use of complete dentures. The habit of smoking was more prevalent in young adults and there was no significant association found between smoking and candidiasis.

The presence of recurrent aphthae being 1.6% in our
population is drastically less than found in a study in Jordanian adults where it was concluded to be a common problem. However, these results were comparable to those of Chattopadhyay found in the American population and García-Pola Vallejo MJ in the Spanish population. The most common site in our observations was the lip followed by the buccal mucosa. The lesions were found more in males who were non-smokers.

The information was gathered from questionnaire surveys which could lead to bias on the subject’s part. The limited size of the study sample is another shortcoming along with the fact that detailed data on the predictors of oral lesions such as nutritional status could not be assessed.

Conclusion:
The study observes the increased risk of oral submucous fibrosis with consumption of tobacco such as gutkha and paan masala. Also, the habit of smoking has been reaffirmed as a risk factor for oral leukoplakia. Interventional public health programmes discouraging the use of tobacco should be formulated.

References:
THE AWARENESS IN BIOMEDICAL WASTE MANAGEMENT OF NURSING STAFF AT A TERTIARY CARE HOSPITAL OF MANGALORE, SOUTH INDIA

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Abstract:

Introduction: In country like India, where there is big and complex health care system, mixed economy, private and Government hospitals working together; while providing services generate waste. It is estimated that the quantity of waste generated from hospitals in our country ranges between 0.5 and 2.0 kg/bed/day and annually about 0.33 million tons of waste are generated in India.

Aim and objectives: To study the awareness of nursing staff about the biomedical waste segregation in a tertiary care center.

Material and methods: A cross-sectional study was conducted among the nurses of Justice K.S. Hegde Hospital, Derlakatte. Total of 123 nurses who were present at the time were the study subjects. The pre-tested semi-structured questionnaire which was validated by face validation method was distributed.

Results: The total of 96.66% of nurses knew the segregation of biomedical waste was the need of the hour. 90% of them felt they have adequate knowledge about segregation. 96% knew the color coding of sharps and human anatomical waste. But 99% knew the colour coding of blood, blood products and microbiological waste. 67% knew the colour coding of pharmacological waste and double glove disposal. Only 89.3% were confident that they followed the correct methods of segregation.

Keywords: Biomedical waste, Hospital waste, nursing staff.

Introduction:

The Bio-Medical Waste means any solid, fluid or liquid waste including the containers and any intermediate product, which is generated during the diagnosis treatment or immunization of human beings or animal. It includes human tissues, body fluids, excreta, unused drugs, swabs, disposable syringes and sticky bandages etc. The doctors, nurses, technicians, sweepers, hospital visitors, patients, rag pickers and their relatives are exposed routinely to Bio-Medical Waste and are at more risk from the many fatal infections due to indiscriminate management.¹ potential generators of Bio-Medical Waste.²

In country like India, where there is big and complex health care system, mixed economy, private and Government hospitals working together; while providing services generate waste. It is estimated that the quantity of waste generated from hospitals in our country ranges between 0.5 and 2.0 kg/bed/day and annually about 0.33 million tons of waste are generated in India²

Segregation means “separation of different types of wastes by sorting or the systematic separation of Bio-Medical Waste into designated categories.” Hospital waste is not managed properly it proves to be harmful to the environment. It not only poses a threat to the employees working in the hospital, but also to the people surrounding that area. Infectious waste can cause diseases like Hepatitis A & B, AIDS, Typhoid, Boils, etc. If a syringe, previously used by an AIDS patient, is reused, it can affect the person using
it. So, the hospital staff should dispose of the syringes properly, by cutting the needles of the syringes with the help of a cutter, so that the needle cannot be reused. When waste containing plastics are burnt, Dioxin is produced, which can cause Cancer, birth defects, decreased psychomotor ability, hearing defects, cognitive defects and behavioural alternations in infants.

Y. Saraf, M. Shinde, S.C. Tiwari Study showed that all respondents had good knowledge about segregation of waste material generated in hospital. Although level of knowledge was more among doctors & nurses as compared to the ward boys & Sweepers.  

Akter N, Hussain Z, Trankler J, Parkpian P. It was been quite evident that a satisfactory hospital waste management system in government hospitals and several private clinics was severely lacking. Many doctors and nurses were not fully aware about segregation of waste material generated in hospital. 

Rasheed S, Iqbal S, Baig LA, Mufti K. Segregation and use of colour codes revealed gaps, which needed correction. About 70% of the healthcare facilities used a needle cutter/destroyer for sharps management.  

With such mixed results we tried to see the awareness about hospital waste segregation among nurses, in a tertiary care hospital.

**Material and methods:**  
A cross-sectional study was conducted among the nurses of Justice K.S. Hegde Hospital, Derlakatte. Total of 123 nurses who were present at the time were the study subjects. 3 of the questionnaires were not able to be collected, so in the end we had 120 subjects as participants. The pre-tested semi-structured questionnaire which was validated by face validation method was distributed. The anonymity of the participants was maintained and informed verbal consent was taken from the subjects. Also the subjects are given choices of filling the form or leaving it blank. The data was entered in excel and analyzed. The questions contained

**Results:**
The total of 96.66% of nurses knew the segregation of biomedical waste was the need of the hour. 90% of them felt they have adequate knowledge about segregation. 18% felt that the knowledge imparted in their course was not adequate enough for their day to day segregation. 20% of them felt that the ward boys are not competent enough to segregate biomedical waste. When tested for their actual knowledge 96% knew the color coding of sharps and human anatomical waste. But 99% knew the colour coding of blood, blood products and microbiological waste. But only 67% knew the colour coding of pharmacological waste. Similarly when segregation of double gloves which were used in the procedures was asked only 66.6% answered the correct way. But 80% had a correct knowledge of hazardous illness due to improper waste management.10% of them did not know how to manage the infected Lenin in the hospital. Only 89.3% were confident that they followed the correct methods of segregation.

<table>
<thead>
<tr>
<th>Factors</th>
<th>Percentage positive</th>
<th>Percentage negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Felt need of segregation among nursing staff</td>
<td>9.66%</td>
<td>3.33%</td>
</tr>
<tr>
<td>Self reporting of adequacy in knowledge</td>
<td>90%</td>
<td>7% (no) and 3% (don't know)</td>
</tr>
<tr>
<td>Self reporting of adequacy in training during their college</td>
<td>82%</td>
<td>18%</td>
</tr>
<tr>
<td>Nurses perception about ward boys knowledge</td>
<td>80% felt they have adequate knowledge</td>
<td>20% felt their knowledge is not adequate</td>
</tr>
<tr>
<td>Knowledge of segregation of sharps and needles</td>
<td>96%</td>
<td>4%</td>
</tr>
<tr>
<td>Knowledge of human anatomical waste segregation</td>
<td>96%</td>
<td>4%</td>
</tr>
<tr>
<td>Segregation of microbiological and blood products</td>
<td>99%</td>
<td>1%</td>
</tr>
<tr>
<td>Knowledge in double glove procedure to segregate the waste</td>
<td>66%</td>
<td>33%</td>
</tr>
<tr>
<td>Disinfection of infected lennin</td>
<td>90%</td>
<td>10%</td>
</tr>
<tr>
<td>Observation of correct procedure followed by the nurses</td>
<td>89.3%</td>
<td>10.7%</td>
</tr>
</tbody>
</table>
Discussion:
It is very interesting to know that 90% of the nursing staff knew about colour coding in biomedical waste which is much higher as compared to earlier studies in north India which the awareness was much less from 87%. But 97% of them felt that the knowledge is felt need of the hour. We have seen in all earlier studies that the sharps color coding and right disposal was a problem in 15-20%. But this problem is only 4% which is significantly higher knowledge. 99% knew about blood and blood products which is very good but it was similar in earlier study that this segregation was priority and was higher than 90%. Pharmacological waste and its disposal was always a problem and the knowledge remained poor as in earlier studies \(^{(6,7)}\) and also in our study that right disposal is unknown by 23% of the nurses in our study hospital too. The disposal of double gloves was unknown by 24% which is a huge gap emphasizing on improvement of their knowledge in biomedical waste management. Though 99% were aware how the disposal of blood and blood products it is more interesting to know that only 89% were confident on their knowledge of biomedical waste management which is similar to earlier studies \(^{(5,6,7,8)}\). Also the commonest problem of infected linen handling was not known by 10% that is 12 nurses, which is really big issue needs an immediate training. The biomedical waste is a hazardous material to health which needs more emphasis. We need to follow the continued education for nursing and staff, by addressing this issue repeatedly in their meetings and in their curriculum. It is also found 97% feel they need such education and 18% were not happy with the amount of knowledge imparted to them in their courses and feel they need more focus on this matter while they work in hospitals.

Conclusion:
Though the knowledge of nursing staff is increased in recent years there is a large knowledge gap in certain issues which needs to be addressed.

Acknowledgements:
All nursing staff of Justice charitable hospital

References:
1. Mukesh Yadav, Hospital waste - a major problem; Indian Journal of Community Medicine; Vol. 8 No. 4, October - December 2001, 277
8. Rajiv Kumar1, Anil Kumar Gupta1, Arun Kumar Aggarwal and Ashok Kumar. A descriptive study on evaluation of bio-medical waste management in a tertiary care public hospital of North India; Journal of Environmental Health Science & Engineering 2014, 12:69
Introduction:

The outcome of endodontic treatment depends on the complete elimination of microorganisms present in the root canal by instrumentation, irrigation and the use of effective sealant. An ideal root canal sealer should prevent bacterial recolonisation and recontamination of the canal system completely and be non-antigenic, non-tumerogenic and non-toxic.

Several materials have been recommended as root sealers however, none of them has so far been proved to be an ideal sealer. Despite differences of opinions on the spectrum of antimicrobial activity, Zinc Oxide Eugenol (ZOE) is one of the most commonly used root canal sealer in endodontics. Electron beam (e-beam) is an ionizing radiation and known to cause physiochemical and biological changes. The aim of this study was to evaluate the effect of e-beam irradiation on bioactive properties of ZOE.

Methodology:

The homogenous mixture of ZOE was prepared as per manufacturer’s instructions and discs of 6 mm were prepared by loading the paste into sterile moulds. After complete drying discs were aseptically removed and subjected to e-beam irradiation at doses of 250 Gy, 500 Gy, 750 Gy and 1000 Gy at Microtron Centre, Mangalore University. Antimicrobial and antibiofilm properties of both control (non-irradiated) and irradiated sealer against Enterococcus faecalis, Staphylococcus aureus, Streptococcus mutans and Candida albicans were determined by well diffusion method and antibiofilm by O’Toole method, respectively. The cytotoxicity was determined by using MTT assay on human gingival fibroblasts.

Results:

The antimicrobial effect of ZOE was observed only against S. aureus and C. albicans. The ZOE sealer irradiated at 1000 Gy showed a significantly (P< 0.001) increased antimicrobial effect against S. aureus and C. albicans compared to control ZOE. However, the substantially increased antibiofilm activity against C. albicans was noticed in the ZOE irradiated at 250 Gy. There was no significant (P>0.05) difference in cytotoxicity between control and irradiated ZOE.

Conclusion:

The e-beam irradiated endodontic sealer ZOE at 1000 Gy and 250 Gy significantly enhanced the antimicrobial and antibiofilm activity respectively without changing its biocompatibility.

Keywords: Electron beam irradiation, Endodontic sealers, Zinc Oxide Eugenol, Oral pathogens, Antimicrobial activity, Cytotoxicity.
effective tool to decompose the organic substances and reduce the toxicity\(^9\).

*Enterococcus faecalis, Staphylococcus aureus, Streptococcus mutans* and *Candida albicans* are among the few endodontic pathogens causing the failure of the root canal treatment and reinfections \(^5, 10\). In this study, antimicrobial and cytotoxic activity of the most commonly used sealer ZOE was evaluated before and after exposing to e-beam irradiation against persistent microbes and human gingival fibroblasts, respectively.

**Materials and Methods:**

The commercially available ZOE (Septodent, Mumbai) was purchased from the market. The emulsion of zinc oxide and eugenol prepared as per manufacturers’ instructions. The discs of ZOE (6×4 mm) after complete drying, were aseptically removed from the mould and divided into control and experimental (irradiated) groups. The experimental group discs were irradiated by e-beam at 250 Gy, 500 Gy, 750 Gy and 1000 Gy at a dose rate of 500 Gy/min using the Microtron facility available at Department of Physics, Mangalore University.

The antimicrobial activity of control and irradiated sealers was evaluated by well diffusion and biofilm inhibition assays. The microorganisms *E. faecalis* (ATCC 29212), *S. aureus* (ATCC 25923), *S. mutans* (MTCC 890) and *C. albicans* (ATCC 90028) were obtained from the stock cultures of Nitte University Centre for Science Education and Research. The bacteria and fungus were subcultured in Mueller Hinton Agar (MHA) and Sabouraud Dextrose Agar (SDA), respectively.

The well diffusion assay was carried out according to the slightly modified method of Filho MT et al\(^11\). Briefly, the optical densities of seven hrs old bacterial and fungal cultures were adjusted to 0.5 McFarland standard and swabbed uniformly on the 20 ml of solidified MHA and SDA medium. Then, control and irradiated sealers were placed aseptically to the wells of 6×4 mm prepared by using sterile cork and borer. Followed by overnight incubation of culture plates at 37°C, the zones of inhibition were recorded in mm.

The biofilm inhibition ability of sealer was determined on the endodontic pathogens grown in 96 well plates as described by O'Toole \(^12\). The control and irradiated sealers were immersed in 1 ml of Mueller Hinton Broth (MHB) and Sabouraud Dextrose Broth (SDB) for 24 hrs at room temperature. The 20 µl of the elute was inoculated into the each wells and incubated for 15 min at room temperature. Then the contents were discarded, followed by gentle wash in phosphate buffered saline (PBS, pH 7), the biofilms were stained with 0.1% crystal violet stain for 15 min. Excess stain was removed by washing the biofilm in double distilled water for three times. Following the destaining with 30% acetic acid, the quantification of viable cells was performed by taking the optical density reading at 560nm using Lisa chem plate reader.

The cytotoxicity of sealers to human gingival fibroblasts was evaluated by MTT 3-(4,5-dimethythiazol-2-yl)-2,5-diphenyl tetrazolium bromide assay \(^13\). Briefly, 20 µl of eluted fraction of sealers, which were pre-incubated in 1 ml Dulbecco's Modified Eagle Medium (DMEM) for 24 hrs at room temperature was inoculated to well containing 1×10\(^5\) cells in 96-well microtiter plate and incubated for 15 min at 37°C in 5% CO\(_2\). Then the wells were washed once with PBS. The cytotoxicity of sealers was evaluated by incubating the cells with 100 µl of MTT dye (0.05 mg/ml) in PBS for 4 hrs at 37°C in 5% CO\(_2\) incubator. The intensity of the colour was measured by adding dimethyl sulphoxide (DMSO) at 545 nm using Lisa chem plate reader.

All the assays were performed in triplicates. The results obtained were analyzed by one way ANOVA. The level of significance was considered at 5%.

**Results and Discussion:**

The antimicrobial activity of ZOE was observed only against *S. aureus* and *C. albicans*. However, the ZOE sealer irradiated at 1000 Gy showed a significantly (P< 0.001) increased antimicrobial activity against *S. aureus* (Figure 1 and 7) and *C. albicans* (Figure 2 and 8) compared to control ZOE.
Keywords: Electron beam irradiation, Endodontic sealers, Zinc Oxide Eugenol, Oral pathogens, Antimicrobial, Cytotoxicity.

Veena A Shetty

Figure 1: Zone of inhibition by control and irradiated ZOE against *S. aureus*

Figure 2: Zone of inhibition by control and irradiated ZOE against *C. albicans*

Figure 3: *E. faecalis* biofilm suppression by ZOE and irradiated ZOE.

Figure 4: *S. aureus* biofilm suppression by ZOE and irradiated ZOE.

Figure 5: *C. albicans* biofilm suppression by ZOE and irradiated ZOE.

Figure 6: Cytotoxicity of ZOE and irradiated ZOE

Figure 7: The antimicrobial activity of ZOE at 1000 Gy against *S. aureus*

Figure 8: The antimicrobial activity of ZOE at 1000 Gy against *C. albicans*
The antibiofilm activity of sealer was observed against E. faecalis, S. aureus and C. albicans. In addition, the irradiated sealers showed an increased inhibition of E. faecalis (Figure 3), S. aureus (Figure 4) and C. albicans (Figure 5) biofilm. The ZOE irradiated at 250 Gy showed the substantially increased (P<0.01) suppression effect on the formation of biofilm by C. albicans. In cytotoxicity assay, the percentage viability of cells was observed as 92.82%, 83.52% and 87.12% when treated with control, 250 Gy and 1000 Gy irradiated ZOE's, respectively, and demonstrated that the cytotoxic effect of irradiated ZOE's was insignificant (P>0.05) compared to control (Figure 6).

Zinc oxide eugenol based sealers are most commonly employed sealants in endodontics. Eugenol is a potent antimicrobial agent, therefore the antimicrobial activity of ZOE-based sealants attributed to the free eugenol released from set material. Supporting these observations, previous studies also reported that the cytotoxic effect of irradiated ZOE's due to their free eugenol component.

It has been reported that the irradiation of pharmaceutical compounds did not affect the biological properties like antimicrobial activity. In addition, it is used as a tool to degrade the detergents and reduce the adverse effects. The significantly decreased acute toxicity of sodium dodecyl sulfate was seen after e-beam irradiation at 3 and 6 kGy. So in this study, efforts have been made to evaluate the effect of e-beam on antimicrobial and cytotoxic activity on locally available ZOE-based sealer.

In this study the antimicrobial activity of ZOE-based sealant was observed only against S. aureus and C. albicans. On both the microbes, a significantly increased antimicrobial activity of irradiated ZOE-based sealer was seen at 1000 Gy of e-beam irradiation. Biofilm of S. aureus, E. faecalis and C. albicans was significantly suppressed by ZOE. There was no significant difference in suppression of E. faecalis and S. aureus biofilm by irradiated ZOE, but C. albicans biofilm was significantly suppressed by ZOE irradiated at 250 Gy. The biocompatibility of ZOE was not altered as there was no significant (P>0.05) difference between ZOE and irradiated ZOE at 250 Gy.

Conclusions:
Based on the present study e-beam irradiation might be a tool in enhancing the antibacterial and antifungal activity of the sealers.

Acknowledgement:
Authors gratefully acknowledge the financial support given by the Department of Atomic Energy, Board of Research in Nuclear Sciences (BRNS), Government of India.

References:
16. Lindqvist L, Otteskog O. Eugenol- liberation from the dental materials by the Department of Atomic Energy, Board of Research in Nuclear Sciences (BRNS), Government of India.
KNOWLEDGE AND PREVALENCE OF DIABETES AND HYPERTENSION AMONG ADULTS IN SELECTED VILLAGES OF UDUPI DISTRICT - KARNATAKA

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Abstract :
Objectives : to assess the prevalence and knowledge of diabetes and hypertension among adults and to find the association between knowledge level and variables.

Methods : Descriptive survey was conducted among adults in the selected villages of Udupi district during July 2009- July 2010. The study subjects were interviewed to collect the details with a questionnaire. Total 385 adults were selected by non-probability convenient sampling technique. Data were entered in SPSS11.5 version and analysed using descriptive and inferential statistics.

Results : Out of 385 adults, 27.8% of adults were females and 72.2% had their education up to primary level. Majority (82.2%) of the adults were having unskilled occupation and 96% of them had exposure to mass media. Majority (50.4%) of them had average knowledge on diabetes mellitus and prevalence was found to be only 5%. Majority (50.6%) of the sample had average level of knowledge about hypertension and the prevalence of hypertension was 19.5%. Result shows that there is no significant association between knowledge and selected variables.

Key words: Hypertension, Diabetes, Prevalence, Knowledge

Introduction :
Diabetes mellitus is the single most important metabolic disease recognized worldwide as one of the leading cause of death and disability. The problem has reached pandemic proportions. Type 2 diabetes is the commonest form of diabetes constituting almost 90% of diabetic population. Prevalence of diabetes in the adults worldwide was estimated to be 4.0% in 1995 and expected to be 5.4% by the year 2025. Its incidence is higher in developing countries than developed countries. It has been estimated that presently 19.4 million individuals are affected by diabetes and these numbers are expected to increase to 57.2 million by the year 2025 (one-sixth of the world total). World Health Organization (WHO) has already declared India as the global capital of diabetes and WHO has revised the predicted number of diabetics in India to be nearly 80 million by 2030¹.

Hypertension poses a significant risk for the development of heart disease and chronic kidney disease. Worldwide, the major causes for chronic kidney disease are diabetes mellitus and hypertension. A recent estimate suggests that approximately one billion adults have hypertension (333 million in economically developed and 639 million in economically developing countries); with the highest prevalence being noted in Eastern Europe and the Latin American/Caribbean region². The global response to this challenge is prevention, early detection, and treatment. Hypertension is a massive public health problem in India, incurring tremendous physical, emotional and financial loss. Due to limited resource allocation in the health sector, the available facilities seem to be scarcely available. A previous study conducted among the middle aged
population of Kerala in 2003 showed 54.5% prevalence of hypertension.3

Methods & Materials:
A community based cross sectional descriptive survey study was carried out during the year 2009-2010 in Athrady, Marne & Hirebettu villages of Udupi District. A non-probability convenient sampling was used to select 385 samples and collect data from them by using structured and validated knowledge questionnaire on diabetes mellitus & hypertension. The adults were between the age group of 40-60 years, residing in the villages, willing to participate and present at home during the time data collection. An adult who could not read Kannada (local language) was excluded from the study.

Demographic Proforma consisted of age, education, occupation, food habits and exposure to mass media.

Fifteen Multiple Choice Questions (MCQ) were developed to assess the knowledge on diabetes mellitus and 15 MCQ for hypertension; each with maximum score of 15 and minimum score of zero. Knowledge scores were arbitrarily classified as low (0-5), average (6-10) and good (11-15) level. Each individual was screened for diabetes mellitus by performing Benedict’s test and for hypertension by monitoring the blood pressure using calibrated sphygmomanometer.

The reliability of the tool was determined by test-retest method. The reliability co-efficient was r=0.70. Administrative permission was obtained to collect the data from the concerned authorities. A written consent was also obtained from the eligible participants for this study and data were collected between July 2009 and July 2010. Data were analyzed using descriptive and inferential statistics.

Tables 1: Frequency & Percentage of distribution of samples characteristics. N=385

<table>
<thead>
<tr>
<th>Variables</th>
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<tr>
<td>male</td>
<td>107</td>
<td>27.8</td>
</tr>
<tr>
<td>female</td>
<td>278</td>
<td>72.2</td>
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<tr>
<td>mixed</td>
<td>242</td>
<td>62.9</td>
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</table>

Fig 1: Knowledge score on Diabetes Mellitus

Fig 2: Prevalence of diabetes

Figure 3 : Knowledge level regarding Hypertension

Fig 4 - Prevalence of Hypertension
Results:
Out of 385 samples 27.8% of adults were females and 72.2% had their education up to Primary school level. Majority (82.2%) of the adults were having unskilled occupation, 62% were consuming mixed diet and 96% of them had exposure to mass media (Table1). Majority (50.4%) of them had average knowledge on diabetes mellitus and hypertension (50.6%) (Fig. 1&3). The prevalence of hypertension was 19.5% and diabetes was 5% (fig 2&4). Result shows that there was no significant association between knowledge on diabetes mellitus and selected variables (Table 2).

Discussion:
Diabetes mellitus and cardiovascular diseases lead the list of all non-communicable diseases. A study done by Jali MV found that prevalence of diabetes was more among males (10.38%) compared with females (7.90%) but the findings were statistically not significant. According to the age, the prevalence of diabetes was more in the age groups 30-39 (9.62%) and 40-49 years (18.24%). This shows that the changing trends in disease occurrence are affecting the people of productive age group and making them socioeconomically inefficient.

The overall prevalence of hypertension in the study subject was 19.5% (75 of 385). A similar study was conducted in Trivandrum, Kerala and the result showed that the prevalence of hypertension is high (47%) but the awareness among the people is low which is contrary to the present study findings where the prevalence is 19.5% only and awareness is average.

Another study was conducted in Aurangabad, Maharashtra from June 2005 to December 2006 among 1297 persons and it showed that the prevalence was 7.24%.

Conclusion:
The worldwide prevalence of diabetes mellitus and hypertension has risen dramatically in the developing countries over the past two decades. Regular screening of adults is essential for early detection and care. There are limited studies on awareness of diabetes and hypertension in rural communities. India is going to face a big challenge posed by these diseases and its complications.

References:

Table 2 : Chi-Square test computed between knowledge score of adults and selected variables

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</table>
Keywords: Knowledge, breast cancer, utilization, mammogram.

- Arkierupaia Shadap

Introduction:
Breast development occurs in distinct stages throughout a woman's life from birth to puberty, during menstruation period, child bearing age and till woman reaches menopause. Once ovulation and menstruation begin, the maturing of the breasts begins and continues to grow. Women may also experience changes in breast texture and feeling particularly lumpy. As age increases by 35 years, there is a gradual shrinking of the mammary glands. By the time a woman reaches her late 40s and early 50s, menopause begins and the levels of oestrogen and progesterone begin to fluctuate, with levels of oestrone dramatically decreasing and this leads to many symptoms. The connective tissue of the breast becomes dehydrated and inelastic, and the breast tissue shrinks, loses shape and leads to the "sagging" of the breasts. As age advanced these are the changes in woman's breast which are normal, but some woman may have changes like lump which are tender and non-tender, abnormal discharge from the breast, ulceration, redness; these are all the early pathological changes which may cause malignancy.

Globally more than one million women are estimated to be diagnosed with breast cancer every year, and more than 410,000 will die from breast cancer. Cancer facts revealed that the age-standardised incidence rate for breast cancer in India is 22.9 per 100,000, one-third that of Western
countries and the mortality rates are disproportionately higher. Breast cancer accounts for 22.2% of all new cancer diagnoses and 17.2% of all cancer deaths among women in India. Breast cancer in urban areas of India is three times higher than in rural parts of the country. According to India statistics, the number of new breast cancer cases is about 115,000 per year and this is expected to rise to 250,000 new cases per year by 2015. If discovered early breast cancer can usually be cured; however, early detection through screening is the only way to reduce mortality. The most common screening for the early detection is breast self-examination and mammogram. It has been shown that it reduced the breast cancer mortality by 30% in women aged 50 and older. A descriptive study done at Saudi, found that 56% women were unaware of these changes and some of them are reluctant to go for check-up due to many reasons such as; lack of knowledge, shyness, fears and delay in the treatment leads to complications and death. Breast cancer has overtaken cervical cancer to become the leading site of cancer in Delhi, Bangalore, Mumbai, Chennai, Bhopal, Ahmedabad, Kolkata with the relative population ranging from 21.7% - 28.7%. Incidence of breast cancer in Bangalore increased from 14.5% in 1990 to 23.5% in 2005. Cases of breast cancer among younger age group have increased by 15 – 20%. It indicates each year, 1,82000 women are diagnosed with breast cancer and 43,300 die. It has been observed that breast cancer has been increasing in its onset in the Karnataka with 25% of the cancer is breast cancer.

Promotion of health and prevention of disease is a very important responsibility of nurses towards the community people. There is no doubt that nurses are effective health care workers in disseminating the knowledge on breast cancer, its screening tests and motivate the utilization of health care services. Also facts gathered from literatures revealed that there is less study related to breast cancer and utilization of mammogram among the community people of Udupi. So, in an attempt to elicit the knowledge and utilization of mammogram as a screening tool for early detection, “a descriptive study to assess the knowledge on breast cancer, awareness and utilization of mammogram among women in the selected villages of Udupi” was undertaken.

The purpose of undertaken the study was to provide information through health education and leaflet on breast cancer based on their knowledge on breast cancer, awareness and utilization of mammogram. This provides the evidence base regarding the importance of health information for preventing morbidity and mortality among the target populations.

**Materials and Methods:**
The research design selected for the study was a descriptive survey approach. A non-probability purposive sampling technique was used to select the sample for the study. The sample consists of three hundred and twenty women residing at Athrady and Hirrebettu villages, Udupi District, Karnataka. Three tools were developed and send for pretesting after content validity and test-re-test reliability. After the ethical clearance, administrative permission and consent from participants, data was collected using the following tools during 15th Jan. 2013 to 22nd Feb.2013.

1. Tool 1: Demographic proforma
2. Tool 2: Knowledge questionnaire on breast cancer
3. Tool 3: Utilization of mammogram

**Findings of the study:**
The study findings revealed that 42.1% of the women were within the age group of 35- 44 years. About 85.9% are married women and 92.5% belonged to the Hindu religion. Majority 45.3% had primary education, occupation of these women 59.4% were housewife and 59.4% of their monthly family income falls within Rs.3001- 5000. Out of 320 women, 87.5% have heard about breast cancer and 42.8% obtained the source of information from the health personnel. (Table 1)
Out of 320 women, 46.6% had poor knowledge, 45.3% had average knowledge and 8.1% had good knowledge score on breast cancer. (Figure 1)

Out of 320 women, majority 80.9% are not aware of mammogram and only 19.1% are aware of it and none had utilized mammogram. (Figure 2)

Of 61(19.1%) women who were aware of mammogram, 49.1% know that it is available in nearby hospital. The sources of information for the mammogram are majority 67.2% from health personnel and 72.1% believe that mammogram can detect breast cancer at the earliest. (Figure 3)

Knowledge on breast cancer was found to be significantly associated with variables like age, marital status, education and source of information about breast cancer. Chi square test was used to find the association between knowledge and the demographic variables.

The limitations of the study were, since non-probability sampling and only two villages were used, so generalization of the study was limited to the sample. Association of the utilization of mammogram cannot be
done, as none of the sample has undergone mammogram utilization.

Implications: The study revealed that women were having low knowledge on breast cancer and very less population were aware of mammogram which is one of the screening test for breast cancer. Their low knowledge on breast cancer and unaware of the screening test is the reason for not utilising mammogram even those who are aware of mammogram. There was a significant association of knowledge on breast cancer to age, marital, education and source of information about breast cancer. These findings have the wider implications for nursing practice, education, administrator and research.

A nurse educator may be oriented through the findings of the present study and able to provide adequate education and assist the people in developing their self-care potential. Nurses are the important and responsible providers who play an important role in imparting knowledge and help the community people in the early detection of the breast cancer. The present nursing curriculum is community oriented where emphasis is given to preventive aspects rather than curative. The practice nurse can encourage and motivate the target population for health seeking behaviour. Innovative teaching can be used for imparting the knowledge to the public which in turn will improve their utilization of the available health care services. As a nurse administrator we can organize awareness programme and proper education for the community women regarding breast cancer and how to identify the risk factors for the early detection and prevention of morbidity and mortality rate. Data will provide the new concept to conduct further research in the field of nursing practice. This will further improve the community women's health and motivate them to adopt healthier lifestyle.

Conclusion:
To conclude, we can make more recommendations. In-depth health education messages through mass media, newspapers should be tailored to fulfill knowledge gap among all population. Intensive educational campaigns to tackle the observed educational deficits should be planned in order to raise awareness towards breast cancer its risk factors with emphasis on role of prevention and guidelines for screening through self -breast examination, clinical breast examination and mammography. We as nurse must continue to remind and update the community women about breast cancer disease and women’s cancer screening practices must be reinforced.

Acknowledgement:
We would like to thank all the participants and friends for their contribution and support during the study.

References:

Keywords : Knowledge, breast cancer, utilization, mammogram.
- Arkierupaia Shadap
EVALUATION OF SALIVARY ENZYMES IN POST MENOPAUSAL WOMEN WITH AND WITHOUT PERIODONTITIS

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Abstract:
Aim: To compare the levels of Lactate dehydrogenase (LDH) and alkaline phosphatase (ALP) in post-menopausal women with and without periodontitis

Methodology: A cross-sectional pilot study was conducted. A total of 50 postmenopausal women were recruited and categorized into two groups based on their periodontal status. Their salivary samples were collected and subjected to Lactate dehydrogenase (LDH) and alkaline phosphatase (ALP) estimation in the laboratory

Results: The activity of LDH and ALP were significantly higher in the post-menopausal women with periodontitis than those without periodontitis.

Conclusion: The present study demonstrated post-menopausal women may have exaggerated inflammatory response to dental plaque.

Keywords: Lactate dehydrogenase (LDH), Alkaline phosphatase (ALP), post-menopause, periodontitis, saliva

Introduction:
Periodontitis is an infectious disease of microbial origin, the progression of which is, however, mediated through host related factors. These host factors, may be, further modulated by various systemic factors, the female sex hormones, being one of them.¹² The effects of circulating estradiol (E2) on the periodontal tissues homeostasis have previously been well documented.³

Menopause is permanent cessation of menstrual cycle after 12 consecutive months of amenorrhea and is also characterized with decreasing levels of estradiol (E2) as the principal circulating estrogen.¹ Estrogen deficiency enhances the rate of breakdown of the connective tissue components of the gingiva by stimulating synthesis of matrix metalloproteinases, nitrous oxide, and several cytokines implicated in bone resorption, especially in response to bacterial infection. Thus, it has been proposed that alteration in the levels of sex hormones may exacerbate periodontal tissue breakdown by altering host response.⁵⁻⁶

Lactate dehydrogenase (LDH) and alkaline phosphatase (ALP) are intracellular cytoplasmic enzymes that previously been used as markers for early diagnosis of periodontal disease. The extracellular presence of LDH is thought to be related to cell necrosis and tissue breakdown while alkaline phosphatase is indicative of bone turnover and an increase in its levels indicates bone resorption.⁷⁻⁸

In recent years, saliva has been recognised as a bio-fluid that can be used to evaluate for markers of various disease processes due its ease of availability and non-invasive means of collection. The composition of this oral fluid is influenced by constituents derived not only from the major and minor salivary glands, but also from gingival crevicular fluid (GCF), serum, bacteria, desquamated epithelial cells
etc.

The purpose of the present study was to investigate salivary levels of lactate dehydrogenase and alkaline phosphatase in postmenopausal women with and without periodontitis.

Methodology:
Ethical clearance was obtained from the institution Ethics committee. This cross-sectional study was conducted in the department of Periodontics, A. B. Shetty Memorial Institute of Dental Sciences, Mangalore and Department of Obstetrics and Gynecology, K. S. Hegde Hospital, Nitte University, Deralakatte, Mangalore. The total of 72 postmenopausal women were screened while 50 patients among them were selected for the study based on following selection criteria.

Inclusion criteria: a) Individuals age between 45-55 years b) Naturally attained menopause c) 20-28 natural teeth to present

Exclusion criteria: a) Patient on any medications b) Patient with any other systemic diseases.

A detailed medical and dental history was recorded. An informed written consent was obtained from selected patients who were categorized into two groups, Group-A postmenopausal women with healthy periodontium and Group-B postmenopausal women with periodontitis based on periodontal health status.

Periodontal examination:
The periodontal status was assessed by measuring severity of gingival inflammation by using Löe and Silness Gingival index, and periodontal pocket was measured at mesio-facial, mid facial, disto-facial, disto-lingual, mid lingual and mesio-lingual areas in millimeters using Michigan ‘O’ probe with William’s graduation.

The loss of attachment (LOA) was calculated based on the position of marginal gingiva to cement-enamel junction.

Collection of saliva:
Unstimulated saliva was collected in a sterile container and stored at -20°C, later these samples were brought to room temperature and then subjected for estimation of LDH and ALP levels.

Enzyme estimation:
LDH and ALP activity were measured at 37°C in laboratory by using Aspen Laboratory kit and Star 21+ semi auto analyzer. Pyruvate and 4-nitrophenylphosphate were used as substrate to determine LDH and ALP levels.

Statistical analysis:
The obtained values were tabulated and analyzed by using Independent Student’s ‘t’ test. Correlation among groups interpreted using Pearson correlation coefficient and the p<0.05 was considered to be significant.

Results:
Table 1 Independent Student’s ‘t’ value obtained between mean values of LDH and ALP levels between two groups was found to be very significant [p<0.01]. Table 2 Correlation coefficient at 0.05 level [2 tailed test] between LDH and loss of attachment [LOA] was significant and also there was significant differences found between gingival index and pocket depth.

Discussion:
Estrogen deficiency is reported to increase a woman’s risk for developing various acute and chronic diseases. The possible association between menopause and periodontal disease progression has been discussed in many studies. However, the results have been inconclusive, with some studies suggesting that menopause related systemic conditions may induce increased alveolar bone resorption and periodontal attachment loss, while others have suggested no such relationship. The present study sought to evaluate the influence of the post-menopausal state on the periodontal tissue by evaluated the salivary levels of LDH and ALP in post-menopausal women with and without periodontal disease.

Most of previous literature that focused on LDH as a diagnosis marker for periodontal disease has been carried out in samples of gingival crevicular fluid (GCF). Studies that have evaluated periodontal disease activity and LDH...
Table 1: Mean and standard deviation of age, LDH and ALP for both the study groups.

<table>
<thead>
<tr>
<th>Group</th>
<th>N=25</th>
<th>Mean</th>
<th>Std Deviation</th>
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<tr>
<td></td>
<td></td>
<td>Age</td>
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<td>ALP level (IU/L)</td>
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<td></td>
<td></td>
<td>52.64</td>
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<td>LDH level (IU/L)</td>
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<td>278.34</td>
<td>89.5</td>
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</table>

*p value <0.01

Table 2: Correlation of LDH and ALP levels in saliva with gingival index, loss of attachment and pocket depth for group B patients.

<table>
<thead>
<tr>
<th>LDH Level</th>
<th>Pearson Correlation</th>
<th>Gingival index</th>
<th>Loss of Attachment</th>
<th>Pocket depth</th>
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</thead>
<tbody>
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<td>ALP Level</td>
<td>Pearson Correlation</td>
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<td>0.593*</td>
<td>0.348</td>
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<td></td>
<td>0.105</td>
<td>0.277</td>
<td>0.228</td>
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*p value<0.01

Graph 1: LDH levels in Group A and Group B

Graph 2: ALP levels in Group A and Group B

The existing literature about the levels of activity of LDH in saliva is scarce. These studies have demonstrated significantly higher levels of salivary LDH activity in individuals with periodontal disease than those obtained in patients with a healthy periodontium. De La Pen~ a et al. Previous evidence suggests that the main source of LDH in whole saliva is the oral epithelium and not the salivary glands.

Alkaline Phosphatase (ALP) found in whole saliva originate from salivary secretions, the GCF and disposed bacterial cells from dental biofilms and mucosal surfaces. Earlier studies have demonstrated a significant positive correlation between salivary ALP and periodontal disease severity and inflammation.

In postmenopausal women, studies have shown that plasma ALP and LDH activities were significantly elevated when compared to that of the pre-menopausal women and this was thought to be due to hormonal influence.

In the present study, salivary levels of LDH and ALP showed significant increase in postmenopausal women with periodontitis as compared with postmenopausal women without periodontitis. There was also a significant correlation between LDH and ALP with clinical parameters.

Though the levels of LDH and ALP showed a significant difference between the two groups it was within normal values suggesting that the systemic status of the patient may have a limited role in the etiopathogenesis of periodontal disease.

As a predictive indicator for future periodontal breakdown, both LDH and ALP has not been supported by research findings and therefore may best serve as a marker in periodontal inflammatory state and thus, facilitate treatment planning and monitoring. Kinney et al 2007.

Within the limits of the present study, our present data, suggests that menopausal state may only have a limited influence on the severity of periodontal disease, but may have influenced an exaggerated inflammatory response to plaque.

Keywords: Lactate dehydrogenase (LDH), Alkaline phosphatase (ALP), post-menopause, periodontitis, saliva - Santhosh Shenoy B.
References:


Keywords:
- Lactate dehydrogenase (LDH)
- Alkaline phosphatase (ALP)
- post-menopause
- periodontitis
- saliva

Santhosh Shenoy B.
BASIC LIFE SUPPORT- A STITCH IN TIME

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Abstract:
Basic Life Support is the identification of emergency medical conditions such as stroke, cardiac arrest, foreign body obstruction; cardiopulmonary resuscitation (CPR) and defibrillation. The main aim of CPR is to increase the blood supply to the brain and the heart. Any delay in providing CPR reduces the chances of survival for the victim. Thus timely CPR is also mandatory. Training in Basic life Support skills is a must for medical and paramedical professionals and students. Moreover, it is essential to train even the layman in these skills as bystanders are the first and the best rescuers if trained adequately. American Heart Association (AHA) guidelines are one of the most widely accepted ones in terms of measures for basic life support. These guidelines are updated every five years. The last update was in 2010. Through, this article an attempt has been made to throw light on the 2005 protocol and 2010 updates as recommended by AHA.

Keywords: cardiac arrest, cardiopulmonary resuscitation, rescue breaths, chest compressions

Introduction:
Basic Life Support is a sequence of medical care which is provided as a life saving measure in cases of medical emergencies such as sudden cardiac arrest, drowning, choking and trauma.

Sudden cardiac death [SCD] is thought to be a cause of one fourth of the human deaths. Of the various causes of sudden cardiac death, ventricular fibrillation is found to be the most common. [1]

The main aims of Basic Life Support include:
Dealing with the unconscious victim
Preventing further injury
Improving the chances of survival till definitive medical help arrives

Considering the aims above, it becomes essential for even a layman to learn basic life support skills as bystanders are the best rescuers if trained efficiently.

The American Heart Association (AHA) recommends a four link Chain of Survival for resuscitation of a victim who has collapsed. [2]

It includes (Figure 1):
Activating the emergency medical services
Delivering Cardiopulmonary Resuscitation (CPR)
Shock delivery with a defibrillator
Post resuscitation care by healthcare organisations

Check for response:
The first step in the event of a collapse is to try to elicit a response from the adult. The rescuer may forcefully tap the patient and ask him if he is alright. If the patient responds, the rescuer must immediately call the nearest emergency medical help available. Ensuring this, he must return back to the victim and continue to monitor him.

Call Emergency Medical Help:
If the patient does not respond, the rescuer should immediately leave to call for emergency medical help. Care should be taken to avoid panic and inform the emergency medical service of the exact venue of the occurrence. Following this the rescuer must return immediately and start with CPR.
If two rescuers are available, one must start immediately with CPR while the other takes care of calling for emergency help. At no rate, should it be assumed that patient recovery will not require emergency help and the manoeuvres by the rescuers will be enough. Emergency help has to be called for without giving it a second thought or discussion. In case if the lone rescuer can conclude that the collapse is due to asphyxia of any cause, he must provide CPR (cycles) and then proceed onto contacting the emergency help.

Opening the Airway
The manoeuvre indicated for this is a head tilt and a chin lift. However if any spine injury is suspected, a jaw thrust should be used instead of a head tilt. In the case, where jaw thrust is not possible, one must not hesitate to use a head tilt - chin lift procedure even in case of a suspected spine injury. [2]. This is important to consider as 2% individuals having blunt trauma have a chance of suffering an underlying spine injury. (3)

Check for breathing
One must Look-Listen-Feel for breathing. On failure to determine if any breathing is present, the rescuer must give 2 rescue breaths. [2]. We should not mistake occasional gasps as effective breaths. A few occasional gasps should be considered as no breathing and such a situation demands rescue breaths.

Rescue Breaths
As reported by Deakin et al only compressions have limited ability to maintain adequate gas exchange in cases of advanced stages of cardiac arrest. [1]

As per the AHA guidelines, a rescue breath must extend over a period of 1 second. The adequacy of the rescue breath is gauged on the basis of its ability to produce a noticeable rise of the chest. Very forceful breaths should be avoided as they can cause gastric inflation. It can cause aspiration, regurgitation, and restriction of lung movement and reduced respiratory compliance. [4]. Hence the need to extend one rescue breath, for a period of 1 second. The aim to notice a chest rise is to deliver air nearly equal to the tidal volume. The various modalities of delivering rescue breaths include,

1. Mouth-to-Mouth Rescue Breathing
2. Mouth to barrier device
3. Mouth to nose
4. Bag mask ventilation

Check for pulse
It is often difficult to detect pulse in a collapsed victim even if it is present. In such cases the rescuer must not spend more than 10 seconds to detect pulse. After 10 seconds, failure of detection of pulse warrants start of CPR without wasting further time [2]. Carotid pulse is to be palpated. It is located by placing the fingers just between the trachea and the muscles at the side of the neck.

Chest compressions
It is essential to deliver effective chest compressions. Chest compressions are delivered in the region of the middle of the sternum between the nipple line. Compressions are delivered at the rate of 100 per minute with a compression depth of 1.5 to 2 inches. [2] Chest should be allowed to completely recoil after each compression. Any interruptions during the chest compressions should be reduced.

As per the AHA guidelines, with the victim in supine position, the rescuer kneels besides the victim’s chest. The heels of the two palms are placed one over another with palms overlapped and parallel. The heel of the palm placed lower, is placed in the middle of the sternum on the nipple line.

A compression to ventilation ratio of 30:2 is recommended. In cases of cardiac arrest with an obstructed airway pulmonary ventilation assumes a great importance. Ventilation improves arterial oxygenation whereas in case of compressions only, a near desaturation of arterial oxygen concentration is seen. [5]

Defibrillator
As mentioned earlier ventricular fibrillation is most commonly found in the cases of sudden cardiac arrest. Defibrillation thus highly improves the chances of survival.
An Automated External Defibrillator (AED) is commonly used for this purpose. These are devices which can identify if the victim requires shock. It can then deliver the required shock. CPR should be performed consistently until the AED arrives. Also if more than one rescuer is present, one should continue with CPR while the other attaches the AED pads.

The four universal steps for operating an AED as given by AHA are:

1. The AED is switched on.
2. AED pads attached to the bare chest of the victim.
3. Analyse the rhythm after “clearing” the victim. To “clear” the victim is to make sure that no one is touching the victim including the rescuer.
4. If the shock is required, command to clear the victim is given again by the AED.
5. Resume CPR after shock delivery or if shock is not required.
6. Shock is delivered after every 5 cycles or two minutes of CPR.

2010 updates in Basic Life Support as recommended by AHA:

1. A-B-C to C-A-B

The 2010 Guidelines for Cardiopulmonary resuscitation (CPR) and emergency cardiovascular care (ECC) [6] show a change in the sequence from Airway-Breathing-Circulation to Circulation-Airway-Breathing (Figure 3). It was often seen that the chest compressions were given much later than actually recommended. This was due to the prolonged time sometimes required to open the airway or retrieve the ventilation device. When chest compressions are delivered first, the breaths should be given with a minimal delay.
A very important recommendation includes a team approach rather than a single rescuer. This will allow the group of rescuers to perform different actions simultaneously making the process highly efficient.

2. Eliminating look-listen-feel

Rescuers often wasted time in checking if the victim is breathing. This often delayed the delivery of CPR. Also while looking for breathing, occasional gasps were often mistaken as breathing causing a failure of delivering CPR when the patient actually requires it.

Conclusion:

The protocol for basic life support as given by AHA is being updated every five years on the basis of evidence based studies. Training and updating the knowledge in basic life support is mandatory for medical and paramedical professionals and students. Moreover, it is the duty of these personnel to enlighten the layman about the importance of learning skills of basic life support. A prompt action can prevent the medical condition to progress further and thus save a life. Indeed, a stitch in time saves nine.

References:

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UNILATERAL BICONDYLAR HOFFA FRACTURE WITH A FRACTURE SHAFT AND DISLOCATED KNEE AND HIP IN A MIDDLE AGED ADULT: A RARE CASE REPORT

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Abstract:
Fracture at the distal end of the femur usually occurs in the sagittal plane. Hoffa fracture, i.e., coronal slice fracture of the condyles of the femur, is rare in adults and even rarer in children.

In the case we wish to discuss here presented to our emergency room with an open knee injury due to a road traffic accident. Imaging of the right lower limb revealed an open Gustilo-Anderson type IIIB bicondylar Hoffa fracture with an anterior dislocation of knee with a comminuted patella and a shaft of femur fracture with a posteriorly dislocated hip.

He underwent a successful stabilization and cannulated cancellous screw fixation of the Hoffa fracture and fixation of other injuries.

Keywords: Hoffa fracture, posterior dislocation of hip, Bicondylar, cannulated cancellous screws, Supracondylar fracture of femur

Introduction:
Fracture at the distal end of the femur usually occurs in the sagittal plane.¹ Coronal shear fracture of the distal femoral condyle is an unusual injury. Albert Hoffa first described this fracture in 1904.²

To our best knowledge not many unilateral bicondylar Hoffa fractures have been reported till date.

As this kind of an injury with associated polytrauma to the same limb is a very rare occurrence, we would like to discuss it in our case report.

Case Report:

A 45 year old gentleman with an alleged history of road traffic accident presented to us in the emergency room with injury to the right lower limb, 12 hours after the injury. On examination an open wound over the right knee with the distal femur protruding from the wound site, with comminuted patella fracture with complete rupture of the cruciate ligaments and the patellar retinaculum of the knee was noted (Figure 1). Contamination was noted at the wound site. His affected hip was noted in flexion, adduction and internal rotation. The limb saturation was noted to be 100% with no distal neurovascular deficits.

He had no history of any medical complaints and had stable vitals.

Radiography revealed:
• An anterior dislocated right knee with medial and lateral condyle fracture of the right femur (Bicondylar Hoffa fracture), comminuted fracture right patella (Figure 2A)
• Fracture right femur at midshaft (Figure 2B)
• Posteriorly dislocated right hip (Figure 2C)

The limb was splinted and he was started on intravenous fluids and antibiotics and was immediately rushed to the operating room.
Keywords: Hoffa fracture, posterior dislocation of hip, Bicondylar, cannulated cancellous screws, Supracondylar fracture of femur - Arjun Ballal

Figure 1: Open wound over the right knee exposing the bicondylar Hoffa fracture and the distal femur and comminuted fracture of patella.

Figure 2A: An anterior dislocated right knee with medial and lateral condyle fracture of the right femur (Bicondylar Hoffa fracture), comminuted fracture right patella.

Figure 2B: Fracture right femur at midshaft

Figure 2C: Posteriorly dislocated right hip.

Figure 3: After external fixator application. Note the Steinmann pin entering from the lateral tibial condyle and exiting through the medial femoral condyle holding the dislocated knee in place.

Figure 4: Post operative x-ray of right femur showing a short femur nail in situ.

Figure 5: Post-operative x-ray right knee showing reduced bicondylar Hoffa fracture with cannulated cancellous screws in situ.

Figure 6: On post-operative day 21 the skin looks healthy with no signs of infection.
In view of the polytrauma and the contamination a staged protocol was planned.

Initially he underwent a thorough debridement of the wound site. The knee was reduced and stabilized using a Steinmann pin from lateral tibial condyle to the medial femoral condyle. A knee spanning external fixator was applied to stabilize the femur shaft fracture and the fracture of the condyles. Then a closed reduction of the hip and partial patellectomy was done (Figure 3).

Patient was maintained on epidural analgesics. Continuous monitoring of vitals and limb saturation was done. Intravenous fluids and antibiotics were continued.

Three days later when the skin conditions improved and no discharge was noted from the wound site, the patient was taken up for a definite fixation.

He underwent: femur nailing with a 11X36 short femoral nail (Figure 4). Open reduction and internal fixation of the Hoffa fracture was done with 6.5 mm cannulated cancellous screw fixation (Figure5).

Wound inspection was done on a regular basis to look for any signs of infection. He was continued on intravenous antibiotics till post-operative day 10. Suture removal was delayed until post operative day 14. On 3 weeks after the surgery the patient was reviewed and examined, the operated site was noted to be clean with no evident signs of infection and skin looked healthy (Figure 6).

Discussion:
Hoffa fractures are rare injuries, and lateral condyle fractures are more common than medial condyle fractures, probably because of physiological genu valgum; the lateral condyle is the most frequently injured condyle. Hoffa fracture can be associated with extensor mechanism injuries. It usually occurs in adults and rarely affects children. The fracture results from a combination of forces: direct trauma, possibly with an element of abduction. Fall on a flexed knee concentrates the force in the posterior half of the femoral condyles, which is why this injury is more common in two-wheeled vehicle accidents where the knee is in a flexed and abducted position.

Letenneur et al. provided a classification for Hoffa fractures. Type I is a vertical fracture involving the entire condyle parallel to the posterior cortex of the femur. Type II is a fracture of variable size, horizontal to the base of the condyle. They reported the best result with internal fixation and the poorest results in type III.

It is generally accepted that surgical stabilization is necessary to achieve satisfactory function following Hoffa fracture, the reason being that reduction of the fracture fragment is difficult to achieve and maintain by closed reduction and casting/traction techniques, due to the absence of soft tissue attachment.

Operative treatment provides early functional rehabilitation and also decreases the chances of osteoarthritis.

In the literature, there are reports of arthroscopically assisted reduction and internal fixation of Hoffa fracture. Arthroscopic management reduces soft tissue dissection, blood loss, and operative time.

Rehan Ul Haq et al reported of a conjoint bicondylar Hoffa fracture in a 17 year old adult.

Hitesh Lal et al reported a case of unilateral bicondylar Hoffa fracture in a 9 year old child.

References:
Introduction:
Monoarticular synovitis of knee secondary to penetrating splinter injuries of plant origin are rare but a well described entity which is usually under-recognised. This is apparently due to the trivial nature of trauma and a very insidious onset of symptoms. The effusion may be sterile and is due to the irritation of the foreign body to the synovial tissue but occasionally organisms may be isolated.

Radiographs may be negative and MRI may show synovitis without a specific pathology.

Arthroscopy is the most important diagnostic and therapeutic procedure along with radiographic examination in a case of suspicious history and clinical features.

Case Report:
A 59 year old gentleman presented to us with a history of penetrating trauma at a bamboo plantation site when accidentally his sickle cut a wound over the anterior aspect of the knee one month ago. The wound had healed within two weeks without any complications but the knee pain and swelling which gradually progressed with disturbing his daily activities and sleep. He complained of throbbing type of pain, which was not relieved with analgesics and rest. He had no history of fever or chills or any other joint involvement.

He was clinically assessed and effusion was noted at the knee joint (Figure 1), with a fixed flexion deformity and terminally painful range of motion with local rise in temperature. The routine haematological evaluation was normal (total count: 9200, CRP: Negative) and no infectious pathology could be recognised.

X-ray was within normal limits with early features of osteoarthritis. MRI images showed significant effusion in the knee. Diagnostic arthroscopy of the left knee was performed under spinal anaesthesia. There was pale yellow colour clear synovial fluid about 120ml which was drained and sent for evaluation (Figure 2). Synovial tissue was inflamed with features of unhealthy fimbriae. A brown coloured 3-4 mm long slender foreign body was identified.
in the medial joint space overlying the meniscus (Figure 3) and was extracted (Figure 4). No other foreign bodies were recognised on probing the joint. Near total synovectomy of the knee was done.

Closure of the surgical site was done.

The synovial fluid analysis revealed, normal sugar and proteins. The culture reported no growth in the fluid sample. Intravenous antibiotics were stopped at five doses.

Knee exercises were started immediate post op and full range of motion was attained in two months and the operated knee appeared normal like the contralateral knee on review (Figure 5).

**Figure 1:** Left knee showing suprapatellar and parapatellar effusion.

**Figure 2:** Pale yellow synovial fluid drained from the knee.

**Figure 3:** 3-4 mm long slender foreign body identified in the medial joint space overlying the meniscus.

**Figure 4:** 4 mm long slender foreign body after removal from the knee.

**Figure 5:** At 6 weeks post-op the operated knee appears normal just like the contralateral knee

**Discussion and Review of Literature:**

Arthritis caused by plant thorn penetration is well known, especially among children. Blackthorn or date palm thorns caused synovitis is reported in most cases, but it can occur from thorns of several kind of plants. The most commonly affected joint is the knee, but similar processes have been described in the hand, ankle, and wrist.

Historically, failure to discover an organism in the joint fluid after a plant thorn injury led to the hypothesis, first published in 1953, that the synovitis after these injuries was an aseptic inflammatory reaction provoked by alkaloid compounds in the vegetable matter. This disease at that...
time was known as “blackthorn inflammation”.

It was not until 1977 that the first positive culture specimen of synovial fluid after plant thorn injury was reported with growth of *Staphylococcus albus*, *Streptococcus hemolyticus*, and Gram-negative rods. Joint infection caused by *Pantoea agglomerans* was first reported in 1978.

In earlier reports, treatment consisted of arthrotomy and removal of all thorn fragments. In 1980, the advantages of arthroscopy became clear. Arthroscopy may allow complete observation of the joint and extraction of the foreign body, but there still are several pitfalls. Plant fragments usually are too small to be seen and a reactive hypertrophic plica can obscure the presence of an intraarticular foreign body and may be missed by the operating surgeon. This led to the recommendation to remove all the macroscopically abnormal synovial lining. In most instances, this will involve complete synovectomy or recurrence of symptoms is possible. O’Connell RL, Fageir MM, Addison A reported a case of synovitis of the knee due to trauma by a splinter of wood and also removal of the splinter by mini-arthroscopy. Díaz-Martin AA et al; reported a case of arthroscopic removal of a projectile from the knee after a gunshot wound to the knee. Joris F. H. Duerinckx reported a case of subacute synovitis of knee after a rose thorn injury. Muschol M, Drescher W, Petersen W, Hassenpflug J published on ‘Monoarthritis of the pediatric knee joint: differential diagnosis after a thorn injury.’ Wherein the misdiagnosis of a foreign body of knee was made as monoarthritis and arthroscopic removal of the foreign body was done after confirming the diagnosis.

References:
7. Muschol M
A CASE REPORT ON STEVENS-JOHNSON SYNDROME

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Abstract:
Stevens-Johnson syndrome (SJS) and toxic epidermal necrolysis (TEN) are a rare disease which is considered to be more devastating and fatal in nature. Usually symptoms may start with the involvement of epidermis and progress to the various manifestations. Early findings, symptomatic and supportive treatment will have the more positive impact on the outcome of the client.

Keywords: Toxic epidermal necrolysis, skin lesion, Erythematous macules

Introduction:
31 year old lady admitted to the hospital with the chief complaints of high fever, chills, fatigue, sore throat, and edema over the face, lesions over the body and resembled to be affected with burns. On detailed history it was evidenced that she was admitted to some local hospital for the treatment of fever, during the treatment she started developing edema, lesions over the entire body; On physical examination the patient is semiconscious, poorly built, skins are peeling out, (Fig 1) whitish patches in cornea, external ear skin peals out, rhinorrea, reddish lips and bleeding, rashes over the abdomen (Fig 2) and restricted movements were evident. Blood investigation evidenced the decreased level of hemoglobin and platelet counts; culture and hypersensitivity to amikacin, penicilllin, ciprofloxacin, ciftriaxone and found to be allergic to ciprofloxacin. The diagnosis was confirmed as Stevens Johnson Syndrome/Toxic epidermal necrolysis. The patient was treated with Metronidazole 1% gel, paracetamol, pantoprazole and candid. There was a significant improvement was seen in the patient.

Discussion:
Stevens-Johnson syndrome (SJS) and toxic epidermal necrolysis (TEN) are severe adverse reactions to medication. SJS and TEN are conditions characterized by erythematous macules evolving to epidermal detachment and mucous membrane erosions. In SJS there is less than 10% body surface area involvement, in TEN more than 30% and 10-30% overlap cases are evident¹.

TEN and SJS affecting approximately 1or 2/1,000,000 annually, and are considered medical emergencies as they are potentially fatal. Drugs are assumed or identified as the main cause of SJS/TEN in most cases, but Mycoplasma pneumoniae and Herpes simplex virus infections are well documented causes alongside rare cases in which the aetiology remains unknown. Several drugs are at "high" risk of inducing TEN/SJS viz., Allopurinol, Trimethoprim-sulfamethoxazole and other sulfonamide-antibiotics, aminopenicillins, cephalosporins, quinolones, carbamazepine, phentoyin, phenobarbital and NSAID’s of the oxicam-type².

Treatment is primarily supportive and symptomatic. Patients should be treated with special attention to airway and hemodynamic stability, fluid status, wound/burn care, and pain control. Prime care must be directed to fluid replacement and electrolyte correction. Few physicians advocate corticosteroids, cyclophosphamide, plasmapheresis, hemodialysis, and immunoglobulin and oral lesions can be well managed with mouthwashes whereas topical anesthetics are useful in reducing pain and
allowing the patient to take fluids. Skin lesions should be treated as burns and areas of denuded skin must be covered with compresses of saline. To conclude the treatment and management of SJS/TEN should be based on a multidisciplinary approach.

**Fig 1:** Showing skin peeling over the face and hemorrhagic oral mucosa

**Fig 2:** Blisters and red splotches on the face, mouth, and neck

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1. HHF Ho, Diagnosis and Management of Stevens-Johnson Syndrome and Toxic Epidermal Necrolysis. The Hong Kong Medical Diary. VOL.13 NO.10 OCTOBER 2008, Pp:17
OCULAR MANIFESTATIONS OF APLASTIC ANEMIA FOLLOWING PLATELET TRANSFUSION : A CASE REPORT

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Abstract:
Aplastic anaemia is a rare haemopoietic stem-cell disorder that results in pancytopenia and hypocellular bone marrow. Ocular findings are manifestations of preexisting anemia. Here we are reporting a case of aplastic anemia which presented with the ocular findings following platelet transfusion which has not been reported in literature to the best of our knowledge.

Keywords: Aplastic anemia, platelet transfusion, ocular manifestations

Introduction:
Aplastic anaemia is a rare haemopoietic stem-cell disorder that results in pancytopenia and hypocellular bone marrow. Although most cases are acquired, there are unusual inherited forms. The pathophysiology of aplastic anemia is believed to be immune-mediated, with active destruction of blood-forming cells by lymphocytes. Environmental exposures, such as to drugs, viruses, and toxins, are thought to trigger the aberrant immune response in some patients, but most cases are classified as idiopathic.¹

Aplastic anaemia is a life threatening condition. It usually presents with anaemia, bleeding and infection. Ocular findings are manifestations of preexisting anemia. The ocular findings include cotton wool spots, nerve fibre layer or preretinal haemorrhages, vitreous haemorrhages and optic disc oedema.²

Aplastic anemia can be effectively treated by stem-cell transplantation or immunosuppressive therapy. Antithymocyte globulin and cyclosporine restore hematopoiesis in approximately two thirds of patients. Supportive care includes transfusion of RBCs and platelets.³

We are reporting a case of aplastic anemia which presented with the ocular findings following platelet transfusion.

Case report:
A 60 yr old elderly male diagnosed with acquired aplastic anemia, presented with history of sudden diminution of vision in both eyes of 1 week duration, worse in left eye. He had a prior history of fatigability, breathlessness on exertion with fever 2 months back. There was no preceding history of overt bleeding manifestations, trauma, or exposure to noxious chemicals or irradiation. He was a diabetic on treatment. A relevant family history was absent. He had received platelet transfusion a week before he noticed the drop in vision.

On clinical examination, he was moderately built and appeared pale. His vital parameters were normal except that peripheral pulses were weak. Visual acuity was 6/18 in right eye and 6/60 in left eye. Anterior segment findings were unremarkable and pupillary reflex was normal. Intraocular pressure by applanation tonometry was normal. Both eyes fundoscopy showed blurred disc margins with slightly tortuous vessels, extensive...
superficial, deep blotchy and preretinal hemorrhages in the posterior pole with cotton wool spots and macular edema worse in left eye. Optical coherence tomography showed an incomplete PVD in both eyes with subretinal fluid worse in left eye.

Blood investigations revealed low hemoglobin levels at 6.5g%, low white cell count of 2300cells/mm³ and platelets 17000cells/mm³. Serum glucose, electrolytes and urea, folate and vitamin B₁₂ were normal. Screening for blood borne viruses was negative. Trephine bone marrow biopsy had revealed an aplastic marrow. He was subsequently started on cyclosporine. He had received platelets and packed cell transfusion twice. Following the third platelet transfusion patient had noticed a sudden drop in vision.

**Discussion:**

Aplastic anaemia is a life threatening condition. Ocular findings are a manifestation of anemic retinopathy. It is believed that anaemia causes diminished capillary oxygenation, which increases the vessel wall permeability resulting in extravasation of blood products. A direct correlation between the degree of anaemia and the severity of the retinopathy has been reported.

Mansour et al have shown that 78% of cases of aplastic anemia exhibit ophthalmic manifestations. Typical ophthalmic manifestations in aplastic anemia include eyelid hematoma, subconjunctival hemorrhage, cotton wool spots, retinal nerve fiber layer hemorrhage, Roth’s spots, pre-retinal hemorrhage, vitreous hemorrhage, and disc edema.

A case of aplastic anemia simulating central retinal vein occlusion has also been reported. In our case disc edema and vessel tortuosity was not much as in central vein occlusion. Some patients with aplastic anaemia have been reported to have pseudotumour cerebi. Papilloedema associated with aplastic anaemia has been proposed to be due to increased intracranial pressure from anaemia-induced cerebral hypoxia. Our case did not have any signs of raised intracranial pressure.
Our patient developed the visual loss and findings of retinopathy following an episode of platelet transfusion. Visual loss in our case was due to macular edema. To the best of our knowledge, similar presentation following platelet transfusion in a case of aplastic anemia has not been reported. Similar ocular manifestations of blurred vision, retinal edema and hemorrhages were reported 10 days after hypotensive and anticoagulant treatment and blood transfusion in a young female patient diagnosed as HELLP syndrome. Possibility of hemorrhagic retinopathy due to vascular hyperpermeability cannot be ruled out in our case. Thus the treating clinician should anticipate hemorrhagic retinopathy anytime during the course of treatment of aplastic anemia.

References:
A RARE CASE OF SCRUB TYPHUS MASQUERADING AS BREAST ABSCESS

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Abstract:
We are presenting a case of scrub typhus masquerading as breast abscess in a pregnant woman who attended to hospital with history of fever and breast tenderness. A high index of suspicion is necessary as it is rarely seen but easily treatable and without proper and timely treatment, serious complications may arise which carries high mortality rate. Scrub typhus during pregnancy is quite rare. The line of treatment of scrub typhus in pregnancy is also analysed.

Keywords: Scrub typhus, eschar, breast abscess

Introduction:

Scrub typhus is an acute febrile illness caused by Orientia tsutsugamushi (Rickettsia tsutsugamushi) which is principally a parasite of rodents and is transmitted by larval trombiculid mites (chiggers).¹

In India, the presence of scrub typhus and other Rickettsial diseases has been known for several decades. During World War II, scrub typhus produced considerable morbidity and mortality among troops deployed in Southeast Asia. However, there has been a considerable decline in the incidence of scrub typhus in the later decades. Recent reports from several parts of India, including South India, indicate that there is a resurgence of scrub typhus.³ The clinical symptoms of scrub typhus in pregnant women are the same as in the non-pregnant. During pregnancy, scrub typhus may lead to spontaneous abortion, stillbirth, preterm delivery and small for gestational age infants.³

For scrub typhus patients, rickettsial pox patients and some other rickettsiosis patients, an eschar 5–20 mm in diameter is formed at the area bitten by mites or ticks. The area bitten by trombiculid mites initially forms a papule, which becomes a vesicle and then an ulcer, and which is finally covered by a black eschar. The vicinity of the eschar is surrounded by red erythema, and an eschar is typically formed at the time of the manifestation of symptoms.⁴⁵

Case History:

A 21 year old female with 26weeks of pregnancy admitted in antenatal ward with history of fever of one week duration with painful swelling of right breast and body pains. She had received some antibiotic treatment outside. There was no history of jaundice, bleeding manifestations or other gastrointestinal disturbances. There was a history of right breast abscess one and a half year back which was drained surgically. Patient was a known case of asthma. There was no past history of diabetes or hypertension, nor any recent travel history. There was no history of trauma.

Clinical picture of Scrub typhus is typically associated with fever, rash, myalgia and diffuse lymphadenopathy. A necrotic eschar at the inoculating site of the mite is pathognomic of scrub typhus. Complications of scrub typhus usually develop after the first week of illness. Jaundice, renal failure, pneumonitis, ARDS, septic shock, myocarditis and meningoencephalitis are various complications known with this disease.¹

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On physical examination, patient was febrile, anemic, conscious and coherent. There was no jaundice and pedal edema. Patient was dyspneic with tachypnea, pulse rate was 106/min and blood pressure was 90/60 mmHg. On examination bilateral occasional crepitations present in both lungs. Oxygen saturation was 80% at room air and 93% with oxygen. Breast examination revealed tenderness in right breast with local rise of temperature along with a small ulcer along the medial aspect of the breast near the nipple and old healed surgical scar on the lateral aspect of the breast near the nipple area. Patient was treated for breast abscess with injection ceftriaxone and was referred to surgeon and physician. Surgeon advised continuation of same antibiotic treatment thinking of breast abscess. Physician advised bronchodilator inhalational therapy for bronchial asthma as oxygen saturation was low. Laboratory investigations revealed: Hemoglobin was 8.2 grams, total count was 7000 cell/cumm, platelet count was 92000/cumm. Erythrocyte sedimentation rate was 20mm/1 hour, Blood urea was 17 mg/100 ml, serum creatinine was 0.6 mg/100 ml, Serum sodium-153 meq/ltr, potassium-4.3 meq/ltr, Chloride-118 meq/ltr, bicarbonate-20 meq/ltr. Liver function tests were normal. Viral markers and strip test for malaria were negative. Ultrasound breast revealed subcutaneous edema surrounding the area of upper and outer quadrant, extending to the right axilla, suggestive of mastitis. Ultrasound abdomen showed mild hepatosplenomegaly, bilateral pleural effusion and a single live foetus of 27-28 weeks. Electrocardiogram showed tachycardia. Two Dimensional Echocardiogram showed features of hyperdynamic circulation with good ventricular function. Even after three days of antibiotic treatment fever was not subsided and her condition did not improve. The ceftriaxone was replaced with Injection augmentin and amikacin. But there was no improvement. Repeat 2D ECHO revealed minimal pericardial effusion. Again patient was referred to physician and transferred to acute medical care unit. On examination we noticed small eschar over an ulcerated area with purulent base on the medial aspect of breast (Figure-1). We suspected scrub typhus and oral Azithromycin 500 mg per day was given and augmentin was continued. Blood sample was sent for Scrub typhus Elisa test for IgM and the report came as positive. Ulcer swab which was sent for gram stain and culture was negative. On second day of administration of azithromycin fever subsided and oxygen saturation was improved. Two days later, her condition improved and became normal.

**Discussion:**

The eschar is the most useful diagnostic clue in patients with acute febrile illness in areas endemic for Scrub typhus and therefore should be thoroughly examined for its presence especially over the covered areas such as the groin, genitalia, infra-mammary area and axilla. The typical eschar is found to be a slightly raised erythema surrounding a black necrotic center. However, for cases in which an eschar is formed in a warm and damp area, i.e., the axilla area or the perineum, a necrotic eschar is not formed; instead, an ulcer with a shallow, purulent base surrounded by a clear, erythematous band may be formed; in such cases, the eschar could possibly be improperly diagnosed and may be easily overlooked. Though the eschar is painless, in this case because of soft tissue of breast and probably because of secondary infection of scrub typhus ulcer of breast, there was swelling and tenderness because of mastitis. Empiric treatment for 3 days with doxycycline, 100 mg orally twice daily, or with minocycline, 100 mg intravenously twice daily, or for 7 days with chloramphenicol, 25 mg/kg/d orally or intravenously in four divided doses, eliminates most deaths and relapses. Chloramphenicol- and tetracycline-resistant strains have been reported from Southeast Asia, where azithromycin or
roxithromycin may become the drug of choice for children, pregnant women, and patients with refractory disease.\[1\]

Chloramphenicol is classified as class C drug. Clinical data indicate that chloramphenicol is safe to use in pregnancy if it is not circulating at the time of delivery where it may cause gray baby syndrome.\[8\] Ciprofloxacin, in experience with pregnant women in India, is ineffective and should not be used.\[9\]

We are reporting this case of Scrub typhus with breast abscess to highlight the need for strong suspicion especially in pregnant woman because of its dramatic response to treatment and keeping in mind of its severe life threatening complications.

**Conclusion:**

Scrub typhus is grossly under-diagnosed in India due to its non specific clinical presentation limited awareness and low index of suspicion among clinicians, and lack of diagnostic facilities.\[2\] Early diagnosis is important because there is usually an excellent response to treatment and timely anti-microbial therapy may help prevent complications. In developing countries with limited diagnostic facilities, it is prudent to recommend empiric therapy in patients with undifferentiated febrile illness having evidence of multiple system involvement.\[10\] Scrub typhus should be listed in the differential diagnosis of acute febrile illness in pregnant women who either live in or return from endemic areas. The symptoms and signs during pregnancy are not different from non-pregnant women. Treatment with azithromycin is safe during pregnancy.\[3\]

**References:**

TREATMENT OF ANKYLOGLOSSIA USING DIODE LASER
- A CASE REPORT

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Abstract:
Lingual frenulum is the vertical fold of mucous membrane under the tongue, attaching it to the floor of the mouth. This congenital anomaly could cause diastema, difficulties in the movement of the tongue, feeding difficulties, speech disorders and various mechanical and social issues. Conventional frenectomy techniques would include the use of a scalpel, which often requires at least one suture and leads to some degree of post-operative discomfort as well as the need for a return visit to remove the suture. The main advantages of using the diode laser are that there is no bleeding; less of operative pain, no need of anesthesia, and suturing is not required, minimizing post-operative discomfort for the patient, and reducing procedure time for the practitioner.

Keywords: Ankyloglossia, tongue dysfunction, diode laser.

Introduction:
Lingual frenulum is the vertical fold of mucous membrane under the tongue, attaching it to the floor of the mouth; called also frenulum linguae. Ankyloglossia is a congenital anomaly in which there is an abnormally short lingual frenulum, which restricts mobility of the tongue tip. Ankyloglossia may lead to a host of problems like infant feeding difficulties, speech disorders, and various mechanical and social issues related to the inability of the tongue to protrude. Lingual frenectomy is advised for the management of Ankyloglossia. Based on the length of the free tongue, ankyloglossia can be classified as follows:

- Clinically acceptable: normal greater than 16 mm
- Class I: mild ankyloglossia 12 to 16 mm
- Class II: moderate ankyloglossia 8 to 11 mm
- Class III: severe ankyloglossia 3 to 7 mm
- Class IV: complete ankyloglossia: less than 3 mm

Many methods have been used such as scalpel surgery, diathermy, and lasers have been long used. The advantages of laser include a bloodless operating field, no post operative infection or pain and no suturing required. The case report discusses one case of successful management of Ankyloglossia or tongue tie with diode laser.

A 30 year old male reported to the department of Periodontics, AB Shetty memorial institute of dental sciences. Patient had a complaint of difficulty in stretching his tongue completely outside the mouth and also had difficulty in touching the palate with his tongue since birth. Medical and dental history was taken. There was found to be no relevant medical and dental history. The ENT and physical examination was found to be normal. Verbal and written consent were taken from the patient. On intraoral examination it was found that the patient had ankyloglossia (tongue tie) and was classified to be class 1 ankyloglossia (cotelou classification 1999). There was no malocclusion and recession present lingual to the mandibular incisors. The patient was undertaken for a frenotomy procedure under local anaesthesia with 2% lignocaine hydrochloride with 1: 80,000 adrenaline by...
using laser method. Diode laser emitting 810 nm was used in pulsed contact mode at 1.1 joule / sec energy. Safety measures were taken for Dentist, assistant and patient by wearing the recommended protective goggles. The lingual frenal attachment was released in the anterior floor of the mouth. The entire procedure was painless and encountered no bleeding; pack was placed at the end of the procedure. Patient was recalled for follow up after ten days. Patient reported increase in tongue mobility following surgery and healing was satisfactory. Patient did not experience any pain during the healing period. The extension of the tongue outside the mouth had increased from preoperative. The speech articulation had improved after surgery; the patient was able to touch the palate with the tip of the tongue which improved the phonetics.

Discussion:
Diode lasers can be used in continuous wave orgated-pulse modes in contact or out of contact with the tissue. The benefits of using laser in oral surgical procedures are significant, for the clinician as well as the patient. Laser light is monochromatic, coherent and collimated; therefore it delivers a precise burst of energy to the targeted area. There is more efficient incision of the tissues by laser when compared to scalpel, laser generates complete vaporization and coagulates the blood vessels. Laser has a hemostatic effect that eliminates excessive bleeding, which creates clean surgical field, allowing increased precision and accuracy and greatly improving visualization of surgical site. Laser wound causes less bleeding due to sealing of capillaries by protein denaturation and stimulation of clotting factor VII. The thermal effect of laser seals the capillaries and lymphatic which reduces the postoperative bleeding and edema. Number of myofibroblasts found after laser treatment are found to be less. This helps in less wound contraction and scarring. Because of improved healing and hemoftasis, laser wounds can often be left without sutures. Laser assisted frenectomy is believed to provide better postoperative perception of pain and function than with the scalpel technique.

Laser assisted lingual frenectomy is easy, showing excellent precision and less discomfort compared to conventional technique. Patient did not have any complaints related to pain and bleeding Patient was comfortable and there was less bleeding. The pulsed mode was used which provided time for the tissue to cool and prevented collateral tissue damage. High level of sterilization is maintained in diode
treatment which reduces the need for post-operative care and antibiotics.

Conclusion:
Ankyloglossia or tongue-tie is a congenital condition and the treatment being simple and safe. In the present case report, lingual frenectomy was done by diode laser technique which provided the practical benefit to the patient by reducing bleeding, increasing asepsis, decreasing operative and postoperative pain, swelling and no requirement of suture.

References:
Introduction:

Turner syndrome is the most common sex chromosomal abnormality in phenotypic females, and results from loss or abnormality of the second X chromosome. The most common karyotype of Turner syndrome is 45,X0 in 80% of affected females and approximately the remaining 20% may have some variants on the second X chromosome such as an isochromosome of the long arm, ring chromosome or else small short-arm deletions or interstitial long-arm deletions [1].

The incidence of Turner syndrome is estimated to occur in 1 in 2000 to 1 in 5000 live births [2]. The main characteristics of this disorder are short stature, gonadal dysgenesis, primary amenorrhea, decreased fertility, a webbed neck, widely spaced nipples, a broad chest and anomalies of cardiac, renal and endocrine origin [1,3].

Case presentation:

A 14-year-old girl was referred to our cytogenetic laboratory for the reason that short stature, low set ears, webbed neck and no secondary sexual characteristics from department of obstetrics and Gynecology, K S Hegde Hospital, Mangalore. She was second born by cesarean at 40 weeks of gestation to a non-consanguineous parents the mother and father being 40 and 48 year-old respectively. Clinical examination revealed that her height was 133 cm, weight 41 kg. She had absence of secondary sexual characters, lack of axillary and pubic hair, and under developed breast (Tanner stage - I). Ultrasonography findings of pelvic organs revealed 3.8 X 0.6cms uterus, ovaries were not visualized, no adnexal masses and no free fluid noted. She has normal urinary bladder and Gall bladder, absent calculus and neoplasm. The follicular stimulating hormone (FSH) level was very high (80mIU/ml) compared to normal females (FSH-0-13mIU/ml).

We present a female patient who carries a karyotype mos45,X[17]/46,X,del(Xp) [3], a variant of Turner Syndrome, with some of the typical phenotype.
Conventional cytogenetic analysis

Metaphase cells were obtained from PHA (Phytohemagglutinin) stimulated peripheral blood lymphocytes following standard protocols. Slides were stained by conventional Giemsa-Trypsin-Giemsa banding (GTG) technique and 20 well spread metaphases were analyzed microscopically. The chromosome analysis of the patient revealed mos45,X[17]/46,X,del(Xp)[3] (Figure 1) karyotype according to the International System for Human Cytogenetic Nomenclature (ISCN). The result described 85% of the cells has 45,X and 15% of the cell has 46,X,del(Xp).

Detection of mosaicism depends on the proportion of cells present from the additional cell lineages. In routine karyotyping, 20 cells are counted, since this number is sufficient to detect mosaicism at a level of about 5 percent. In this present case we got the second cell line more than 5 percent, even though, we decided to proceed with the FISH (Fluorescence in situ Hybridization) study to score additional number of cells and disclose exact mosaic pattern.

Fluorescence in situ hybridization (FISH) Analysis:

FISH analysis was performed on the same peripheral blood samples harvested for cytogenetic analysis to detect exact mosaicism. 10µl of dual-colour CEP X (Spectrum Green) and CEP Y (Spectrum Orange) probe (Vysis, USA) was applied to the sample, covered with cover slips and sealed with rubber cement. The sample and probe were co-denatured and hybridized using the ThermoBrite Denaturation/Hybridization System. The ThermoBrite unit was programmed to allow 5 minutes of denaturation at 73°C, followed by overnight hybridization at 37°C. Post hybridization wash was performed in 0.4X SSC/0.1% NP-40 at 72°C for 2 minutes) followed by a wash in 2X SSC/0.1% NP-40 at room temperature for 1 minute. The slides were air dried in the dark, then added 10µl of DAPI (4,6-diamidino-2-phenylindole) counter stain. The FISH signals were visualized using Vysis filter sets and an Olympus BX51 fluorescence microscope attached to a FISH View image acquisition and analysis system for FISH (GENASIS, Applied Spectral Imaging, Germany).

We scored 200 interphase nuclei, among this 81% of the cells shown single green signal for X chromosome and remaining 19% of the cells shown two green signals, which authenticate the presence of second abnormal cell line 46,X,del(Xp). In addition, FISH study confirms there is no presence of Y chromosome. The final karyotype was given based on a combination of FISH analysis as well as conventional karyotyping.

Discussion:

Turner syndrome variants include female individuals with partial deletions in the "p" and/or “q” arms of one X chromosome. The deletions of certain X chromosome regionsgenes can lead to specific phenotypic features which are characteristic of “full” or “classic” Turner syndrome and also deletions of the SHOX gene, located in

Figure 1: GTG-banded karyogram of the patient with variant Turner syndrome. 17 cells showed a 45,X karyotype and the remaining 3 cells showed deletion Xp.
the PAR (pseudo autosome region) at Xp22.33, are associated with short stature [4]. Most women with Xp deletion are short, apart from their ovarian function indicating that other structural determinant genes probably lie within these Xp regions [5]. Short stature was localized to a much smaller region midway within this general area between Xp11.2 to Xp22.1. In our case, patient has these characteristic Turner syndrome features might be due to loss of entire “p” arm of X chromosome.

If the status of ovarian function in adolescence is unclear, measurement of follicle-stimulating hormone, luteinizing hormone, and estradiol levels can help to determine the need for hormone-replacement therapy (HRT). Hormone-replacement therapy should be initiated at the age of about 14 years. Earlier treatment may result in a decrement in final height. Psychosocial issues and the patient’s maturity and wishes also need to be considered.

The molecular mechanisms(s) responsible for gonadal failure with X chromosome deletions could involve the loss of putative ovarian determinant gene(s) necessary to be present in two copies during ovarian development. Deletions on X chromosome have been reported in a large number of patients. Deletion Xp11 region result in ovarian failure with menstrual function, even in those with normal menstruation, fertility is very rare [5].

Structural abnormalities of X chromosome variant were more common than the classic 45,X/46,XX karyotype all over the prior studies [6]. Among children with TS, those with less X-chromosome material appear to be more severely affected, especially if they lose paternal X-chromosome material [7]. The age of the parents should not be associated with the formation of structural variants and monosomic X chromosome patients (XO) show less expression than those patients who have additional Xq copies [1]. One author described that frequency of physical abnormalities in Turner syndrome vary with the pattern of karyotype, features and majority are not karyotyped until after the age of 11, usually due to the failure of puberty and he was concerned about the delay of diagnosis [8]. Our patient also diagnosed lately at the age of 14.

A region on Xp11.4 has been proposed as critical for the development of lymphedema. Evidence of fetal lymphedema is manifest as neck webbing, malrotation of ears and low posterior hair line. In our case webbing of neck and low set ears would have been noticed prenatally and diagnosed as early as possible. The prevalence of congenital heart disease among patients with Turner syndrome ranges from 17–45% with no clear phenotype genotype correlations [9]. Congenital cardiac defect and renal malformations are consistently reported in Turner syndrome, with the benevolent conditions of horse shoe kidney and duplex collecting systems being most common [2]. Even though our patient clinical information does not show any risk of congenital heart defect and renal anomalies, we are requesting the clinician to take special consideration to scrutinize blood pressure for the evaluation of cardiac anomalies.

The size of Xp deletions and corresponding genes are more severe in patients with Xp deletion, short neck was more common among them [10]. Approximately 70% of patient with turner syndrome have learning disabilities affecting nonverbal perceptual motor and visuospatial skills, a meta-analysis of 13 studies identified deficits in visuospatial organization, social cognition, nonverbal problem-solving and psychomotor functioning in patients [9]. Several studies of Joanne Rovert have examined the specific mathematics difficulties in females with multidigit addition and subtraction problems, while geometry and the ability to deal with symbols were less disturbed. Our patient also have specific problem with number work, mathematics and spatial tasks and it may be helpful to make teachers aware of this in case extra support like tutoring is needed. However many go on to further or higher education and enjoy full range of job opportunities.

Conclusion:
Turner syndromes represent a condition with both genetic and hormonal determinants that contribute to severe mathematics impairments. Early recognition of Turner syndrome and timely investigations should be helpful in improving the quality of these individuals by potentially
improving the adult height in those who respond to growth hormone therapy and in initiating sex hormone replacement. Also, early detection and management of co-existing illnesses may be life saving for these patients. Physicians should discuss infertility issues and reproductive options with their patients and reassure them about their sexual function. It is important to acknowledge the sense of loss associated with infertility, on the part of both the patient and parents. We conclude for this study that the karyotyping is definitely helpful in the evaluation of short stature and FISH study is essential to detect low level mosaicism with normal X chromosomes in such patients for the appropriate counseling.

Acknowledgement:
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References:
Introduction:
Patients with chronic kidney disease (CKD) are at higher risk of infection compared to the general population. Infection-related hospitalizations contribute substantially to excess morbidity and mortality in patients on dialysis, and infection is the second leading cause of death in this population. Patients who have CKD and do not require renal replacement therapy also seem to be at higher risk of infection compared with patients without CKD; however, data about such patients are very limited. Annual mortality rates in the dialysis population are increased by 10-fold for pneumonia and 100-fold for sepsis compared with the general population. Patients who have CKD and do not require renal replacement therapy also seem to be at higher risk of infection compared with patients without CKD; however, data about such patients are very limited. Annual mortality rates in the dialysis population are increased by 10-fold for pneumonia and 100-fold for sepsis compared with the general population. There is sparse data on primary candida pneumonia in CKD patients and their outcome.

Case 1: A 54 year old male with adult polycystic kidney disease was admitted with fever, breathlessness and productive cough of four days duration. He had clinical and radiological evidence of left lower lobe pneumonia. (Fig.1a). His baseline creatinine was 6 mg/dl (MDRD eGFR 10 ml/min/1.73 m²) which had deteriorated to 11.96 mg/dl (eGFR 4ml/min/1.73m²). His haemoglobin was 7.2 g/dl and total leucocyte count was 13,900 /cu.mm with neutrophil count of 90%. He was initiated on haemodialysis. He was empirically treated with azithromycin and cefoperazone/sulbactum combination and the latter was changed to meropenem due to lack of response. After six days of antibiotic therapy he continued to be pyrexial, hypoxic and his x-ray showed no change. He grew heavy growth of candida (species not specified) in his sputum which was resistant to triazole group of antifungals. Blood culture was negative. He was initiated on anidulafungin which lead to complete radiological resolution in two weeks (Fig.1b). He tolerated the treatment very well but developed generalized hyperpigmentation which resolved after a month of discontinuing the drug. He remained on long term maintenance dialysis.
Case 2: A 74 year old male with long standing hypertension and CKD stage 3 (baseline creatinine 1.8 mg/dl, MDRD eGFR 37ml/min/1.73 m²) presumably secondary to hypertensive nephrosclerosis was admitted with right upper quadrant pain and fever since three days. His serum creatinine had deteriorated to 3.13(MDRD eGFR 20 ml/min/1.73 m²). His haemoglobin was 12.9g/dl and he had neutrophilic leucocytosis with total count of 19600 /cu.mm with 92% neutrophils. Liver function tests were mildly deranged with total bilirubin of 2.2 mg/dl (Direct 1 mg/dl, Indirect 1.2 mg/dl), ALT of 54 U/l with normal AST and alkaline phosphatase. Ultrasound scan showed distended gall bladder with multiple calculi with minimal pericholecystic collection. A diagnosis of acute calculous cholecystitis was made. He had mild hypoxia and preoperative chest radiograph showed atelectasis at the right base. This was thought to be secondary to his abdominal pathology. He was empirically treated with pipercillin/tazobactum and metronidazole and he underwent open cholecystectomy on day three of admission under general anaesthesia. Postoperatively he had pyrexia, neutrophilic leucocytosis and hypoxia. He developed bibasal consolidation with moderate pleural effusion on the right which was aspirated to exclude empyema. His kidney function deteriorated and he was started on haemodialysis. Sputum culture grew heavy growth of resistant candida (species not specified). His blood culture was sterile but pus from the gall bladder grew pseudomonas which was fully sensitive. In spite of the appropriate antibiotic cover for six days he had persistant pyrexia, neutrophilic leucocytosis, worsening hypoxia and chest x-ray changes. He was initiated on anidulafungin with excellent clinical response. His fever, neutrophilia and hypoxia improved, kidney function recovered back to baseline but complete radiological resolution took four weeks. This patient also developed generalized hyperpigmentatation which completely resolved in about four weeks after he finished the antifungal therapy.

Discussion: 
Pneumonia due to candida is extremely rare. There is very little literature available on candida pneumonia in CKD patients. The only accepted criterion for the definitive diagnosis of candida pneumonia is histologic demonstration of the fungus in lung tissue because positive cultures cannot distinguish between true infection and either colonization or sample contamination with oropharyngeal secretions. Another study showed that for sputum culture, the sensitivity, specificity, and the positive and negative predictive values were 85%, 60%, 42%, and 93%, respectively.
respectively; for bronchoalveolar lavage culture, these values were 71%, 57%, 29%, and 89%, respectively. However, sputum culture was the key in initiating therapy in both our patients who had negative bacteriological cultures and no response to broad spectrum antibiotics.

The most common thin-section CT findings of pulmonary candidiasis are multiple nodular opacities, often bilateral which was present in 88% of patients in a study which included 17 hematopoietic stem cell transplant recipients with proven pulmonary candidiasis. Areas of air-space consolidation were identified in 65% patients and areas of ground-glass opacity were seen in 35%. Even though CT scan was not carried out, one of our patients showed changes of unilateral lower lobe consolidation and the other patient had bilateral lower lobe consolidation with right sided effusion on chest x-ray. Pleural effusion was reported in 3 out of 17 patients in the above mentioned study.

Very little data is available on the therapy and outcome of patients with candida pneumonia and none in the CKD population. The current recommendation is not to treat candida isolated from sputum or BAL specimens. But our cases demonstrate that in the relevant clinical setting, positive sputum cultures cannot be ignored and prompt treatment can be lifesaving in this condition with high mortality which can be as high as 84%. Since 2004, several new antifungal agents have become available which are effective against candida resistant to azoles. Anidulafungin, a newer echinocandin, has potent activity against candida species and it showed superior clinical and microbiologic response compared with fluconazole. But the experience with this drug in the setting of CKD is limited and in our cases it was well tolerated except the reversible generalized skin pigmentation which both the patients developed. To our knowledge, this has never been reported before.

To conclude, fungal pneumonia needs to be considered in any immunosuppressed individual presenting with pneumonia poorly responding to standard treatment. Sputum culture is considered not very helpful in the diagnosis of candida pneumonia but in the relevant clinical setting, positive culture should not be ignored. Finally, even though anidulafungin can be extremely effective and well tolerated, reversible skin pigmentation can be an adverse effect. Whether this side effect is limited to patients with CKD is unknown and more studies are needed to address this issue.

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Keywords: Anidulafungin, Candida pneumonia, Chronic Kidney Disease. - Shashidhar Baikunje
ROLE OF PHYTOCHEMICALS IN ORAL POTENTIALLY MALIGNANT DISORDERS: A REVIEW

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Abstract:
Oral cancer is a major global health concern and poses a challenge to diagnostic and therapeutic aspects of healthcare services. Various oral lesions like leukoplakia, erythroplakia, lichen planus and oral submucous fibrosis categorized as orally potential malignant disorders have shown increased incidence of malignant transformation. Free radicals are highly reactive chemical species with capacity to damage nucleic acids, proteins and lipids and bring about changes of clinical significance. Antioxidants help in scavenging these free radicals and prevent disease progression. Naturally occurring phytochemicals play an important role in preventing oxidative stress and protect the cells from damage by free radicals.

Keywords: Antioxidants, phytochemicals, oral potentially malignant disorders, chemoprevention

Introduction:
Oral cancer is a major global health concern with increasing prevalence and high levels of mortality. It poses a major challenge to diagnostic and therapeutic aspects of the healthcare services. Oral and pharyngeal cancers, grouped together constitute the sixth most common cancer in the world.¹ The annual estimated incidence of oral cancer stands at about 275,000 and pharyngeal cancer at about 130,300, excluding nasopharyngeal cancers in developing countries.² The areas characterised by high incidence rates for oral cancer include South and South-East Asia (Sri Lanka, India, Taiwan and Pakistan), parts of western (France) and Eastern Europe (Hungary, Slovakia and Slovenia), parts of Latin America and the Caribbean (Brazil, Uruguay and Puerto Rico) and in the Pacific regions (Papua New Guinea and Melanesia).³ Oral cancer is one of the most common forms of malignancies in India with a prevalence varying from 11% to 52% of all diagnosed cancers in the country.⁴ National Cancer Registry, 2003 identified that the spectrum of the diseases in the country lies in states like Uttar Pradesh, Madhya Pradesh, Bihar, Maharashtra, Gujarat, Andra Pradesh, Karnataka and Tamil Nadu. Variation in incidence depends upon geographic location and adverse habits.

Prognosis of oral cancer is generally poor with a five year survival rate of less than 50%⁵. Local recurrences as well as lymph node metastasis occur in a significant number of the affected people while distant metastasis is often rare. Various oral lesions like leukoplakia, erythroplakia, lichen planus and oral submucous fibrosis are known to have an increased risk of progressing into malignancy. These lesions are collectively termed as 'oral potentially malignant disorders'. WHO in 2005 defined oral potentially malignant disorder as 'the risk of cancer being present in a pre-cancerous lesion or condition, either at the time of initial diagnosis or in the future'.⁶ The term conveys that not all of the lesions described under it will turn into cancer but instead, it blankets a family of morphologic alterations that will potentiate some of the lesions into a malignant transformation. WHO first classified oral potentially malignant disorders into two broad categories, namely, potentially malignant disorders and potentially malignant conditions.
malignant disorders as potentially malignant lesions and potentially malignant conditions (table 1) in 1978. A classification based on etiology of the lesion was later given by Anthony George et al in 2011 (table 2).

It is a well-established fact that virtually all oral cancers are preceded by visible clinical changes in the oral mucosa usually in the form of red or white patches. Early diagnosis of these potentially malignant disorders help in avoiding high levels of morbidity and mortality associated with these lesions. Oxidative stress has always been associated with the development of a wide variety of diseases. It is a process derived from the inability of the body’s endogenous antioxidant defences to scavenge free radicals. Free radicals are highly reactive chemical species characterized by short half-life and are made up of a single atom or groups of atoms that form a molecule with a free electron. This electron is responsible for the high reactivity of free radicals. When free radical derived oxidative damage to nucleic acid, proteins and lipids of extra cellular and cellular matrix is observed, it produces damages of clinical importance. Dietary antioxidants can reduce the risk of cancer. Phenolic compounds derived from a variety of fruits and vegetables show anti-inflammatory and anti-cancer effect. Supplements of phytochemicals including carotenoids and flavonoids demonstrate chemopreventive and chemoprotective activity especially in the cellular proliferation phase.

**Rationale behind the use of antioxidants in management of oral potentially malignant disorders**

Generation of reactive oxygen species by biologic systems either by normal metabolic pathways or as a consequence of exposure to chemical carcinogens contributes to the multi-stage process of carcinogenesis. Some examples of antioxidants include Vitamin C (Ascorbic acid), Vitamin E (Alpha tocopherol), retinol, retinoids and beta-carotene. In 1981 it was discovered that there was an association between low serum beta carotene levels and cancer. There exists an inverse relationship between the levels of these antioxidants in the diet and in the serum and the probability of development of cancer. Cancer develops due to genetic predisposition or due to irreparable oxidative damages to the DNA that cause mutations. Antioxidants are essential in reducing this oxidative stress by scavenging free radicals and thereby reducing mutations, changes in enzyme activity and lipid peroxidation of cellular elements.

Cancer therapeutics mainly concentrates on the final stage of the disease. This limits its preventive potential. Refocus of management of cancer from the end point to the progression of the disease is essential as these interventions will prevent, inhibit and reverse the process of carcinogenesis thereby reducing the long term effects on such individuals. Early detection and treatment of oral potentially malignant disorders will provide a better standard of life to individuals affected by oral cancers.

**Phytochemicals**

The word phytochemicals is derived from the Greek word ‘Phyto’ meaning plant. More than 5000 different types of phytochemicals have been identified but they remain just a small percentage of the total number of such plant chemicals. Phytochemicals are defined as ‘bioactive non-nutrient plant compounds in fruits, vegetables, grains and other plant foods that have been linked to reducing the risk of major chronic diseases’.

Some of the major phytochemicals are:

1. **Beta-carotene**

Approximately 16% of the ingested beta-carotene is transformed to retinol by a two-step process in the intestinal mucosa. It is absorbed by the lymphatics and is not taken up by the extra hepatic tissues like bone marrow, blood cells, spleen, adipose tissue, lungs, muscles and kidney. The possible protective effects of beta carotene is attributed to its antioxidant action by trapping free radicals, particularly peroxy and hydroxyl which are involved in aging and carcinogenesis. It also increases cell mediated immune response due to increased monocyte expression and increased response of tumour necrosis factor alpha. Lower than expected levels of serum beta carotene have been seen in men who smoke cigarettes and...
consume alcohol. Low levels of beta carotene is associated with increased risk of oral cancer. An abundance of beta-carotene has been found in a variety of yellow and green fruits and vegetables.

2. Lycopene
Lycopene is one of the most potent antioxidant and has been hypothesised to prevent carcinogenesis and atherogenesis by protecting critical biomolecules like lipids, lipoproteins and DNA. Lycopene suppresses carcinogen induced phosphorylation of regulatory proteins such as p53 and Rb anti-oncogenes and stops cell division at G1-G0 cell cycle phase. It also reduces cellular proliferation induced by potent mitogens like insulin-like growth factors in various cancer cell lines. It exhibits highest physical quenching rate constant with singlet oxygen. Lycopene is a bright red pigment found in tomatoes and other red fruits like red carrots, watermelons and papayas.

3. Flavonoids
Flavonoids are a group of plant derived phenolic compounds that have been identified to have antioxidant property to reduce the risk of development of chronic diseases. Flavonoids have an additive effect to the endogenous scavenging systems.

They have different functions in the antioxidant system like:

a. Direct Radical Scavenging
Flavonoids stabilize the reactive oxygen species by reacting with the reactive compound of the radical thereby producing a less reactive radical. Few flavonoids directly scavenge superoxide while others scavenge peroxynitrites.

b. Nitric Oxide
Nitric oxide produced by macrophages reacts with free radicals producing peroxynitrite which can react with low density lipoproteins thereby producing irreversible injury to the cell membrane. Flavonoids scavenge nitric oxide as well as peroxynitrite thus reducing the amount of oxidative damage.

c. Xanthine Oxidase
Xanthine dehydrogenase, an enzyme present under physiologic conditions is changed to xanthine oxidase during ischemic conditions. During reperfusion, xanthine oxidase reacts with molecular oxygen thereby producing superoxide free radicals. Flavonoids scavenge these superoxide molecules thus resulting in less oxidative injury.

d. Leukocyte Immobilization
During ischemia and inflammation, leukocytes which are freely moving along the endothelial wall are acted upon by endothelium derived mediators and complement factors and adhere to the endothelial wall and stimulate degranulation of neutrophils. Flavonoids cause a decrease in the number of immobilized leukocytes and total serum complement. They also cause a decrease in the degranulation of neutrophils and mast cells and provide a protective action during reperfusion by modulation of receptor directed calcium channels in the plasma membrane.

One of the best described group of flavonoids, quercetin is found in abundance in onions, apples, broccoli and berries. The second group, narigin is found in citrus fruits. Flavonoids belonging to the catechin group are found primarily in green and black tea as well as in red wine. The last group of flavonoids, anthocyanins are found in strawberries, grapes, wine and tea.

Role of phytochemicals in the prevention of cancer
Free radicals are constantly produced in the body as a result of normal metabolic processes. The key to maintaining health is achieving a balance between free radicals and antioxidants. Over production of free radicals causes oxidative damage to cell membrane lipids, proteins and DNA leading to cancer production. To prevent or slow down the oxidative stress induced by free radicals, sufficient amounts of antioxidants should be consumed. Phytochemicals like carotenoids and flavonoids help to prevent cellular systems from oxidative stress and may also lower the risk of chronic disease. Phytochemicals have a complementary and overlapping mechanism of action like
scavenging of free radicals, regulation of gene expression in cell proliferation and differentiation, inhibition of expression of oncogenes, induction of tumor suppressor gene expression, modulation of enzyme activity in detoxification and regulation of hormone metabolism. 25,26

Natural phytochemicals present in fruits and vegetables have strong antioxidant and anti-proliferative activities. The synergistic effect of various phytochemicals is responsible for its beneficial effect. Individual antioxidants produce varying degrees of tumor regression only at very high doses which is frequently associated with toxicity. At lower doses they may be ineffective or stimulate the growth of tumour cells.27 Therefore the use of a single antioxidant has no therapeutic or clinical significance. Protection against free radicals can be enhanced by consuming a mixture of dietary antioxidants thereby avoiding the toxicity associated with high doses or growth stimulation associated with low doses.

Antioxidants in therapeutics of oral lesions

In general, pre-malignant lesions are not lethal by themselves and are associated with low risk of malignant transformation. The goal of cancer therapeutics is not only treatment of cancer but also the suppression and reversal of pre-malignant lesions. The possible use of antioxidants in oral mucosal lesions include the following:27

1. Prevention of lesions in high risk individuals with mucosa that clinically appears normal with no history of pre-malignant or malignant lesion.
2. Treatment of pre-malignant oral lesions.
3. In patients who had pre-malignant or malignant lesions that have been successfully treated, in order to prevent recurrence of the treated initial lesion or to prevent the development of a secondary or a separate primary.

Non-surgical management of pre-cancerous lesions should be considered, especially if they involve a large surface area and in medically compromised patients. It also provides additional advantages of being non-invasive, relatively cost effective and ease of application. Patients with dermatologic disorders receive doses of beta-carotene as high as 300 mg per day for years with only carotenodermia as a side effect. Clinical trials use doses considerably less than 300 mg per day as beta-carotene levels are minimally elevated when the dose is substantially increased and the possibility of carotenodermia is reduced.28 There was absence of side effects in patients supplemented with 26-120 mg of beta-carotene per day.29 A combination of beta-carotene with vitamin A or retinoids has showed some success in the treatment of oral leukoplakia.30 Alpha-tocopherol in doses as high as 3200 mg per day have been well tolerated by adults without any signs of toxicity.31 Supplements are more effective in achieving high plasma alpha-tocopherol levels than diet modifications. It plays an important role in protecting the cell membranes from lipid peroxidation. Administration of 800 IU of alpha-tocopherol per day for 24 weeks shows some clinical response in patients with oral potentially malignant disorders.32 16 mg of lycopene in divided doses has shown improvement in mouth opening and burning sensation in patients with oral submucous fibrosis.18 Oral supplementation of 4-8 mg of lycopene given over a period of eight months showed significant reduction in hyperkeratosis in patients with oral leukoplakia with no clinical signs of toxicity.32

A practical strategy for people who want to optimize their health through diet modification is by increasing the consumption of fruits, vegetables and whole grains that are rich in antioxidants. A combination of orange, apple, grape and blueberry has displayed a synergistic effect in delivering these antioxidants in sufficient quantities. The phytochemicals present in food differ in their molecular size, polarity and solubility which may affect their bioavailability and distribution in various macromolecules, subcellular organelles, cells, organs and tissues. This synergistic and additive effect of whole foods has been proposed to be responsible for their potent antioxidant and anticancer effects.13

Summary:

Normal metabolic processes produce free radicals in the body. This mechanism is accentuated in the presence of precipitating factors such as smoking or alcohol...
consumption. This causes generation of excess of free radicals. A balance between oxidative free radicals and antioxidants is maintained in the body by oxygen scavengers. In cases where there is an excess of free radical production, these scavenging systems are overwhelmed and fail to reduce the oxidative stress. This causes damage to the cell membrane phospholipids and cell organelles and is termed as oxidative damage. Pre-cancer, cancer and other chronic diseases are mainly caused as a result of this oxidative damage. Use of antioxidant supplements shows promise in the resolution of such potentially malignant disorders.

Phytochemicals show a synergistic function when supplemented along with other antioxidants. Use of a single antioxidant at levels that can suppress or cause regression of pre-malignant lesions may produce features of toxicity like carotenodermia and hypervitaminosis. Hence a combination of various antioxidants should be used for the treatment of such disorders. Before making the decision to use antioxidants for treatment, it is critical to obtain histopathologic diagnosis of the lesion. Lesions diagnosed as hyperkeratotic will take considerable amount of time before showing clinical signs of improvement while lesions diagnosed as dysplastic may not show any positive change. Newer analogues of synthetic retinoic acid show better efficacy of treatment with less instances of toxicity. While surgical management remains the mainstay of treatment of oral potentially malignant disorders, use of antioxidants, particularly newer analogues are gaining importance as non-invasive treatment options. Chemoprevention with these agents is useful in advanced disease or in an adjuvant setting in combination with surgical management, steroid hormones and cytotoxic chemotherapy that are currently available as treatment for patients with oral potentially malignant disorders.

No single antioxidant can replace the health benefits of a diet with a complex mixture of phytochemicals derived from a combination of various fruits, vegetables and whole grains. Phytochemical extracts from such fruits and vegetables have strong antioxidant and antiproliferative effects and a major part of the total antioxidant activity is from the combination of these phytochemicals. Diet modifications along with dietary supplements, nutraceuticals and functional foods can help prevent the development and progression of diseases like cancer.

Further research on the health benefits, efficacy and safety of phytochemicals in whole foods is warranted.
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EMBRYONIC CYSTS, SINUSES AND FISTULAE OF BRANCHIAL ORIGIN

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Abstract:
This brief review hopes to provide basic embryological and anatomical information on location, cause and identification of congenital developmental anomalies related to formation of pharyngeal (branchial) arches to paediatricians, otolaryngologists, obstetricians and neonatologists. The pathological manifestations due to neglect or oversight of these development defects have potential to cause a wide range of clinical disorders.

Correct and timely recognition of these congenital developmental defects and their redress through appropriate surgical and clinical interventions require clinicians to possess a rudimentary grasp of embryological processes.

Keywords: branchial, cysts, sinuses, fistulae

Introduction:
Early recognition and correct diagnosis of congenital lateral cervical dysgenic embryological structures require that a paediatrician have a thorough knowledge of embryology. Congenital birth and developmental malformations, especially those involving the head and neck may, require specialised surgical interference. This paper attempts an overview of the 'side of the neck' developmental embryopathies.

As early as the 5th week of growth, the 5 mm embryo shows discernible branchial or pharyngeal arches at the cranial end of its foregut and surrounding area. Despite the complexity and specificity of the differentiation of ecto-endo-mesodermal entities, there are surprisingly a very low percentage of congenital defects in these areas.

F r e q u e n c y notwithstanding this review may aid the novice clinician embryonic vestiges. The scope of this paper is limited to the pouch / cleft complex only (endoderm/ectoderm).

Branchial cysts
The branchial cysts consist of almost 75% of all the lateral cervical vestiges. The salient features of these cysts are:

a) Almost always unilateral
b) No familial incidence
c) Constancy of position
d) Predominantly unilocular
e) Lined in majority of cases by stratified squamous cells.

These cysts lie at about the level of hyoid, on the carotid sheath deep to the anterior margin of the sternocleidomastoid. Though most cysts are encapsulated completely, some may have an upper or lower pedicle or both. When present the upper pedicle extends from the
supramedial part of the branchial cyst towards the pharynx passing between the external and internal carotid arteries, lateral to the XII (Hypoglossal) nerve.

The inferior pedicle, if present, extends to the medical edges of the sternocleidomastoid attaching itself to the skin at variable levels, as low as the clavicle. Pediculation of a branchial cyst can be confirmed through the application of gentle traction on the cyst: Dimpling of the skin or pharyngeal wall or both, confirms the attachment of a superior, inferior or both pedicles to the cysts.

**External sinuses**

The distinguishing characteristics of the external sinuses are:

a) Present at birth
b) These sinuses open in the lower third of the neck along anterior border of the sternocleidomastoid.

c) Secondary infections and inflammations are common
d) Bilateral in about a third of cases.
e) When unilateral, more common in the right side.
f) Familiar incidence common
g) More often seen in the female than the male.
h) Histologically the epithelium is of the stratified squamous cells type.

Deep sinuses extend upwards between the external and internal carotid arteries, resembling in their extension, to the superior pedicle of the branchial cyst. The calibre of the track is uniform along the length of the sinus, except when the sinus possesses an umbelliform upper extremity. The trumpet shaped external sinus may be confused with the inferiorly pediculated branchial cyst. A search for a patent lower extremity of the tract should confirm the possibility of external sinus.

**Internal sinuses**

The features of these sinuses are somewhat ambiguous

a) Their frequency is not known.
b) Most are symptomless and remain undiagnosed
c) They open into the fauces, posterior to the palatine tonsil
d) An extension from the palatopharyngeus invests the sinuses
e) The lining epithelium is of the respiratory type, ciliated or pseudostratified columnar.

**Complete pharyngocutaneous fistulae**

These fistulae present in the under mentioned characters

a) Opening in the same anatomical plane as the internal and external sinuses.
b) Inflammatory changes frequent
c) Bilateral in about a third of cases
d) Familial disposition recorded
e) Predominantly of the stratified squamous lining epithelium, through often towards the pharyngeal termination, showing ciliated columnar respiratory type cell lining.

Whilst most often the tracts of these complete fistulae are uniform dimension transversely, they may not uncommonly show a distended cyst suspended between two patent small calibre tracts extending to either side.

**Other branchial and associated anomalies**

**Cervicoaural fistulae**

a) Rare
b) Superiorly open into the external auditory meatus
c) Inferiorly open into the skin over angle of the mandible
d) The posterior belly of the digastric muscle lies deep to the course of the tract of these fistulae.

**Branchial cartilages**

Strictly speaking though these inclusions are not of either ecto or endodermal germ origin, cartilaginous nodules are occasionally found within the wall of branchial cysts or fistulae or even as unassociated findings situated in the cervical skin. Branchial cartilaginous nodules have been often discovered in or about the tonsil or in the tongue. They are considered as vestiges of the second arch cartilage (Reichert’s).

**Cervical auricles**

Tags of skin, sometimes protruding from cutaneous orifices
of sinuses or fistulae are known as cervical auricles. These unusual auricles, when present, show bilaterality and a familial preponderance.

**Associated anomalies**

Branchial fistulae are sometimes associated with facial or cervical anomalies. Preauricular sinuses, accessory auricles, (auricular tubercles), hemithyroid or unilateral sternocleidomastoid are examples of some of these remote malformations.

**Aberrant or accessory glandular vestiges**

Vesicular, canalicular or acinar gland tissues often seen normally attached to the foetal thymus or parathyroid may sometimes persist in the neonate. These vesicular structures may distend resembling a branchial cyst. The persistent tissue is said to represent secondary buds or ducts from foetal thymus or parathyroid.

Accessory parathyroids have been described as intra-parathyroidal, intrathyrmic or even in the anterior mediastinum. Mediastinal parathyroid must be suspected when the usual parathyroids are of normal dimension in hyperparathyroidics.

The thymus may in the part or completely remain undescended. A normal thymus may show an accessory cervical portion or even aberrant thymic nodules. Intrathyroide thymic tissue has also been recorded.

**Discussion:**

It is embryologically understandable that, excluding the first cleft to (ectodermal) and first pouch (endodermal) which form the external auditory meatus and the tubothympanic recess respectively, vestigial remnants are at least theoretically possible from all the other pouches and clefts. Indeed, all known lateral cervical vestiges can be easily correlated to defective derivations there from.

One school of embryologists however, believes that all brachial cysts are remains of non-regressed epibranchial vesicles of epibranchial placodes which are thickened ectodermal patches overlying the dorsal extreme of the arches. They play a role in the formation of the cranial nerve ganglia, especially the facial nerve in man and the glossopharyngeal and vagal ganglia in lower vertebrates.

In frequency, the first arch remnants form only 5% of cases seen while the remaining 95% are defects from the 2nd arch. The remaining arches rarely produce any recognizable developmental defects.

Whatever the rationale and theory surrounding the appearance of the congenital lateral cervical vestiges, the specificity of their location, distinct histopathological features and definable anatomical relations are giveaways that every clinician should be familiar with, especially those from specialties that most often and most intimately comes into contact with the age groups that manifests the branchial lateral cervical developmental anomalies.

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A REVIEW OF CURRENT CONCEPTS IN BRUXISM - DIAGNOSIS AND MANAGEMENT

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Abstract:
Bruxism, which can be considered as an umbrella term for clenching and grinding of teeth, is the commonest of the many parafunctional activities of the stomatognathic system. Bruxism can occur during wakefulness or during sleep and each has a different set of causative factors. The early diagnosis and management can prevent the breakdown of the dentition and pain in the orofacial region. Although various treatment modalities are present, the successful management of bruxism lies in the precise diagnosis and isolation of the etiology.

Keywords: Bruxism, Sleep bruxism, Awake bruxism, Current concepts in bruxism, Review of bruxism

Introduction:
Tooth grinding is an activity of significance to the dental specialist because of breakage of dental restorations, tooth damage, induction of temporal headache and temporomandibular disorders.1

Bruxism, which can be considered as an umbrella term for clenching and grinding of teeth, is the commonest of the many parafunctional activities of the stomatognathic system.2 The term Bruxism originates from the Greek word brychein, which means to grind. It was later adopted as 'Bruxism' to describe gnashing and grinding of the teeth occurring without a functional purpose.2

Bruxism can occur during wakefulness or during sleep. The American Academy of Sleeping Disorders proposed the terms Sleep and Awake Bruxism. Bruxism during daytime is commonly a semi voluntary 'clenching' activity and is also known as 'Awake Bruxism' (AB) or Diurnal Bruxism (DB).3

Bruxism during sleep either during daytime or during night is termed as 'Sleep Bruxism' (SB).

Awake bruxism is linked to life stress caused by familial responsibility or work pressure. Sleep Bruxism is an oro-mandibular behaviour that is defined as a stereotyped movement disorder occurring during sleep and characterized by tooth grinding and/or clenching.4 Sleep bruxism was recently classified as sleep related movement disorder according to recent classification of Sleep Disorders.

Prevalence rate of Awake and Sleep Bruxism is about 20% and 8–16% respectively in adult population.5 Awake bruxism occurs predominantly among females while no gender difference is seen for sleep bruxism.6 Onset of Sleep Bruxism is about 1 year of age soon after the eruption of deciduous incisors.7 The disorder appears more frequently in the younger population.7 The prevalence in children is between 14 to 20%.

Causes of bruxism:
Bruxism is said to have a multifactorial etiology.
Central/Patho-Physiological factors:
As bruxism often occurs during sleep, the physiology of sleep has been studied in depth, particularly the 'arousal
response’ in search of possible causes of disorder.

‘Arousal response’ is a sudden change in the depth of the sleep during which the individual either arrives in the lighter sleep stage or actually wakes up. This response is accompanied by body movements, increased heart rate, respiratory changes and increased muscle activity. A study showed 86% of bruxism episodes were associated with arousal response along with involuntary leg movements.  

This indicates that bruxism is a part of arousal response.

Acute use of dopamine precursors like L-dopa inhibits bruxism activity and chronic long term use of L-dopa results in increased bruxism activity.  

Amphetamine which increases the dopamine concentration by facilitating its release has been observed to increase bruxism.  

Nicotine stimulates central dopaminergic activities which might explain the finding that cigarette smokers report bruxism two times more than the non-smokers.  

Psycho social Factors:

Extensive studies have been conducted regarding the role of psychosocial factors in the etiology of bruxism but none of these are determinative due to the absence of large scale longitudinal trials.

Bruxers differs from healthy individuals in the presence of depression, increased levels of hostility and stress sensitivity.  

Bruxing children are more anxious than non bruxers. A multifactorial large scale population study to assess sleep bruxism demonstrated that daytime time clenching could significantly be explained by experienced stress, although experienced stress and anticipated stress were unrelated to sleep bruxism as recorded with ambulatory devices.  

Peripheral Factors:

For an effective management of bruxism, establishment of harmony between maximum intercuspation and centric relation is required.

Assessment and Accurate interpretation of bruxism:

Although bruxism is not a huge handicap, it can influence the quality of human life, especially through dental problems, such as tooth wear leading to inefficiency of mastication, pain in the facial region and tooth fractures. Hence early identification and preventive measures go a long way to protect the occlusion.

Some of the methods of assessment are as follows:

- **Questionnaires:**
  - Questionnaires are adjuncts in both research and clinical situations. This method can be applied to large population but the limitation is the subjective nature of the response. Most bruxism episodes are not accompanied by noise. So a large percentage of adults and children are unaware of their bruxism activity and thus fails to identify themselves as the bruxers.
Clinical evaluation:

Tooth wear is assumed to be synonymous to bruxism. Several studies have demonstrated a positive relationship between tooth wear and bruxism, but others show negative results. Guidelines that help to identify bruxism. Various systems for the classification and measurement of tooth wear have been introduced. One of the many classifications is the Tooth-Wear Index which categorises based on incisal and occlusal wear and was developed to investigate the prevalence and severity of tooth wear.

Bruxcore plate:

The Bruxcore Bruxism-Monitoring Device (BBMD) is an intra-oral appliance that measures sleep bruxism activity objectively. The Bruxcore plate evaluates bruxism activity by counting the number of abraded microdots on its surface and by scoring the volumetric magnitude of abrasion.

Some studies describe a repetitive wear pattern on the occlusal splint, while other studies noted that parafunctional nocturnal dental activity on full-arch occlusal stabilization splints resulted in wear, which was both asymmetric and uneven. However the accuracy of these methods has not been ascertained.

A recording device has been designed for sleep bruxism, an intra-splint force detector (ISFD), which uses an intra-oral appliance to measure the force being produced by tooth contact onto the appliance. The force is detected using a thin, deformation-sensitive piezoelectric film, which is embedded 1–2 mm below the occlusal surface of the appliance. It was confirmed, that the duration of bruxism events during simulated bruxism, i.e. clenching, grinding,
tapping and rhythmic clenching, evaluated with the ISFD, was correlated with that of the masseter EMG.\(^{25}\)

The ISFD did not correctly capture force magnitudes during sustained clenching because of the characteristic of the piezoelectric film, i.e. this transducer is best at detecting rapid changes in force, not static forces. ISFD was not suitable for detecting the magnitude of force during steady-state clenching behaviour.\(^{25}\)

**Masticatory muscle Electromyographic recording:**

One among the plethora of assessment tools, the EMG recording has been used to measure actual sleep bruxism activity directly. The main advantage is that the bruxism can be measured without intra-oral devices, which may change natural bruxism activity.

**Portable EMG recording devices:**

Since the 1970s, sleep bruxism episodes were measured over a period of time in patients' homes with the use of battery-operated EMG recording devices.\(^{26}\) Criteria for the detection of sleep bruxism with the portable EMG recording system have been suggested but their validity in a large population has not yet been confirmed.\(^{26}\) The isolation of sleep bruxism is difficult because of other confounding oro-facial activities (e.g. coughing and mumbling). Also, other sleep disorders cannot be ruled out for e.g. micro arousal, tachycardia and sleep-stage shift.\(^{28}\)

The recording the heart rate was suggested as one of the compensatory measures for improving the accuracy of sleep bruxism recognition. A surface EMG electrode with a built-in buffer-amplifier and a cordless type of EMG measurement system was developed as well, to improve the accuracy of recordings.\(^{27}\)

**Miniature self-contained EMG detector analyser:**

A miniature self-contained EMG detector–analyser (Bite-Strip) was developed as a screening test for moderate to high level bruxers.\(^{27}\) Its salient feature is that the number of bruxism events can be objectively estimated by simply attaching it to the skin over the masseter muscle.

Recently, a miniature self-contained EMG detector-analyser with a biofeedback function (Grindcare, Medotech, Denmark) was developed as a detector and biofeedback device for sleep bruxism.\(^{31}\)

It is a type of contingent electrical stimulation (CES). It enables the online recording of EMG activity of the anterior temporalsis muscle, online processing of EMG signals to detect tooth grinding and clenching and also biofeedback stimulation for reducing sleep bruxism activities.\(^{31}\)

Although scientific confirmation is needed, it is considered as one of the potent devices for detecting and also for managing sleep bruxism.

The portable EMG recording system allows multiple-night recording in a natural environment for the subject with minimal expense.

**Polysomnography:**

Polysomnographic (sleep laboratory) recordings for sleep bruxism includes electroencephalogram, EMG, electrocardiogram and thermally sensitive resistor (monitoring air flow) signals along with simultaneous audio–video recordings.\(^{32}\)

The sleep laboratory setting offers a highly controlled recording environment, hence other sleep disorders (e.g. sleep apnoea and insomnia) can be ruled out and sleep bruxism can be distinguished from other orofacial activities (e.g. myclonus, swallowing and coughing).

**Management of Bruxism:**

Currently no specific treatment exists which can stop sleep bruxism, even though many methods including prosthetic treatment, have been tried over the years. A handful of therapies have been suggested including behaviour modification such as habit awareness, habit reversal therapy, relaxation technique and biofeedback may eliminate awake bruxism.

**Occlusal therapy:**

Management of bruxism via occlusal therapy enlists the aid of occlusal interventions and occlusal appliances.
Occlusal interventions:
A study has tried to justify the effects of occlusal adjustment on the myoelectrical activity of the jaw-closing muscles. However, their brief daytime EMG recordings of postural activity and maximal voluntary clenching cannot be interpreted in terms of bruxism.

Other authors have stated that occlusal rehabilitation further mutilates the dentition beyond what bruxism has created.

At present, the current insights into the etiology of bruxism that the disorder is mainly regulated centrally and not peripherally, future research on this category of management strategies for bruxism seems futile.

Occlusal appliances:
By far, the treatment regime which has withstood the test of time is the procedure of splint therapy. Occlusal appliances are useful adjuncts in the management of sleep bruxism but do not cure bruxism. Occlusal splints are commonly used to prevent tooth wear caused by bruxism.

Literature describes the clinical and laboratory procedures for the various types of splints. These splints have different names (e.g. occlusal bite guard, bruxism appliance, bite plate, night guard, occlusal device) and slightly different appearances and properties, but in essence most of them are hard acrylic-resin stabilization appliances, mostly worn in the maxillary arch.

Hard splints are generally preferred over soft splints (e.g. soft splints are more difficult to adjust than hard ones) to prevent inadvertent tooth movements and because hard splints are more effective in reducing bruxism activity than soft splints. Nociceptive Trigeminal Inhibition (NTI) Clenching Suppression System—a small anterior splint that is supposed to be effective amongst others in the management of bruxism. No evidence for the NTI splint’s long-term efficacy or safety is available so far.

In a study, it was shown that occlusal splint treatment resulted in a decrease in nocturnal EMG activities in about half of the patients, while in another half of the patients, no change or even increase in EMG activity was observed.

However, due to the scarcity of Randomised Control Trial on the efficacy of occlusal splints in the management of bruxism, it is prudent to limit the use of oral splints in the management of bruxism to the prevention or limitation of dental damage that is possibly caused by the disorder.

Behaviour modification:
Psychoanalysis, hypnosis, progressive relaxation, meditation, self-monitoring, sleep hygiene and habit reversal have been prescribed for the management of bruxism. Giving autosuggestion before falling asleep such as ‘I will wake up if I grind my teeth’ is reported by psychoanalysts to help the bruxer become aware of the habit, even while asleep. Unfortunately, autosuggestion lacks scientific strength and is not recommended.

More general relaxation techniques including meditation are supposed to produce a sense of self-esteem and control over one’s body.

Biofeedback and cognitive behavioural therapy:
Biofeedback is based on the principle that bruxers can ‘unlearn’ their behaviour when aware of their adverse jaw
muscle activities. This technique has been applied for bruxism during wakefulness as well as for sleep bruxism.

While awake, patients can be trained to control their jaw muscle activities through auditory or visual feedback. For sleep bruxism, auditory, electrical, vibratory and even taste stimuli can be used for feedback.

Bruxism during wakefulness:
One of the early publications on the use of biofeedback in the management of bruxism during wakefulness was given in 1976. It described an EMG technique that provides auditory feedback from muscle activity letting him know the degree of muscle activity or relaxation that is taking place.

Bruxism while sleeping:
In 1986 a technique was developed which used contingent arousal from sleep with actual awakenings. Few other techniques used a taste stimulus to awaken the patient. Other researchers in 2001 came up with the vibratory stimulation based inhibition system for nocturnal bruxism.

In a demonstration of concept study, in 2003, the effect of contingent electrical lip stimulation on sleep Bruxism was evaluated.

In 2011, a study of the effect of electromyogram biofeedback on daytime clenching behaviour in subjects with masticatory muscle pain was published. Electromyogram (EMG) biofeedback training was performed for a patient, consecutively for 5 days, to ascertain its effect on the regulation of daytime clenching behaviour. Their study concluded that daytime clenching was reduced in the short-term with the help of an EMG biofeedback system under natural circumstances.

Pharmacological management:
The pharmacological management of bruxism has been studied increasingly over the past decades.

A study involving 18 subjects with severe Bruxism was conducted with the administration of a total of 241 injections of BOTOX during a time period of 20 weeks. The study suggested that drugs that have paralytic effect on the muscles through an inhibition of acetylcholine release at the neuromuscular junction (botulinum toxin) decreases bruxism activity especially in severe cases with comorbidities like coma, brain injury, Huntington's disease and autism.

Discussion:
Research focusing on the relationship between bruxism and prosthetic therapy is scarce. There's no conclusive evidence that any prosthetic therapy can eliminate bruxism and likewise, no evidence to support that bruxism is caused by prosthetic therapy.

Several authors and studies have been mentioned while listing the current concepts in the diagnosis and management of bruxism. Despite of this, currently no treatment exists that can stop bruxism. Studies require randomised control studies over a larger population before being considered as the norm.

As far as intra oral devices are concerned, the major problem is that subjects have to wear these devices and this may change the original bruxism activity.

In the use of polysomnography, one major limitation is that a change in the environment for sleep may influence the actual behaviour of bruxism. Another is the expense as multiple nights/ recording is to be taken for the occurrence of sleep bruxism varies over a number of nights.

Handicaps in each technique come in various forms such as when a sound blast was applied as the aversive stimulus. The sound stimulus wakes up the patient, who is then supposed to switch off the sound, thus cutting off their bruxing and resume his/her sleep. The awakenings are a major disadvantage of such approaches because sleep disruption may lead to serious side effects like irritability, excessive daytime sleepiness and exhaustion.

In the pharmacological approach, although some seem promising, they all need further efficacy and safety assessments before clinical recommendations can be made.
A study was conducted to evaluate the efficacy of an occlusal splint (OS) vs Cognitive Behavioural Therapy (CBT) in sleep bruxism patients. The CBT group comprised of problem solving, progressive muscle relaxation, nocturnal feedback, and training for enjoyment. The treatment took over 12 weeks. The OS group received a splint for the same period of time. Both groups were examined pre treatment, post treatment, and 6 month follow up for sleep bruxism activity. The analyses demonstrated a significant reduction in Sleep bruxism activity and increased positive stress coping in both groups.

Physical rehabilitation techniques have been thought to assist in correcting bruxism. The objective of developing or strengthening the jaw opening muscles is to ‘hold the mandible in balance. This involves relaxing the jaw, parting the lips and creating a gap in between the teeth. The tongue should rest on the roof of the mouth and this position should be held comfortably for as long as possible. It encourages jaw relaxation and teaches proper jaw and mouth positioning.

Prosthetic planning should be based on scientific evidence. Systemic reviews have demonstrated survival rates of conventional fixed partial dentures at 94% after 5 yrs and 89% after 10 years. The most common technical failure was fracture of material and loss of retention. In a prospective 15 year follow up study of mandibular implant supported fixed prosthesis, smoking and poor oral hygiene had a greater role in bone loss, while occlusal loading factors such as bruxism, were of minor importance.

Literature on materials for use in FPD fabrication in patients with severe bruxism is sparse. The choice of material is critical especially if opposing natural dentition. These choices often seem to be made from common sense rather than scientific data. Some anecdotal reports include bruxism which is caused by high points on the occlusal surface of new restoration. This helps in grinding away the interference until equilibrium is reached after which the episodes of bruxism stops.

Conclusion:
Bruxism is a common parafunctional disorder occurring both during conscious and otherwise. There are no reliable methods for assessing bruxism which have reasonable diagnostic validity. Since there is no specific treatment available, maximum efforts must be taken to prevent its adverse effects. In the absence of definitive evidence, bruxism can be best managed by occlusal appliances, counselling, change in lifestyle and pharmacological interventions. When prosthetic treatment is indicated, effort must be made to reduce the heavy occlusal loading on all components thus maintaining the integrity of the prosthesis.

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**Materials and Methods:** This section should deal with the materials used and the methodology (how the work was carried out). The procedure adopted should be described in sufficient detail to allow the experiment to be interpreted and repeated by the readers, if desired. The number of subjects, the number of groups, the study design, sources of drugs with dosage regimen or instruments used, statistical methods and ethical aspects must be mentioned under the section. The data collection procedure must be described. If a procedure is a commonly used, giving a previously published reference would suffice. If a method is not well known (though previously published) it is better to describe it briefly with due acknowledgement. Give explicit descriptions of modifications or new methods so that the readers can judge their
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