Materials and Methods

3.0 MATERIALS AND METHODS

3.1 Study Design

A cross-sectional descriptive survey was planned in the school children of Mysuru district. A prior permission from the Deputy Director for Public Instructions (DDPI) was obtained [Annexure i]. Also, prior permission was obtained from the concerned school authorities.

3.2 Study setting

The epidemiological survey was planned to be conducted in four taluks of Mysuru district. Three grades of school i.e., Government school, Private aided and Private Unaided school in the four taluks of Mysuru district were considered. The idea to include the three grades were to evaluate and compare the orthodontic treatment needs, awareness towards orthodontic need of the children of Mysuru district.

3.3 Target population

School children around the age of 12 years were the target population.

3.4 Sample and Sampling Technique

Sample size was determined using sample size formula for prevalence study. The prevalence rate was fixed at 40% and relative precision was 0.12. The sample size obtained was 840 subjects.

The sample size for the study was calculated using the formula,

\[ n = \frac{Z^2 P(1-P)}{d^2} \]

Where, \( n \) = sample size,
\( Z \) = Z statistic for a level of confidence,
\( P \) = expected prevalence and
\( d \) = precision

Two stage sampling was planned for the present study. In the first stage of sampling, four taluks were selected using simple random sampling by lottery method. Out of 840 subjects, 210 subjects were equally distributed to four taluks of Mysuru district. In the second stage of sampling, from each Taluk, schools were selected randomly to include 210 subjects by lottery method. In each school children in the age group of 12 years were chosen using the class Attendance register.
Map I- Location Map of Mysuru District (Extract From masterplansindia.com)
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Map II- Location Map of Mysuru Taluk (Extract from masterplansindia.com)

Map III- Location Map of Hunsur Taluk (Extract From masterplansindia.com)
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Map IV - Location Map OF Nanjangud Taluk (Extract from masterplansindia.com)

Map V - Location Map of T- Narsipura Taluk (Extract from masterplansindia.com)
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Conceptualization of the Data

↓
Ethical clearance from the Institutional Review Board for the survey
↓
Permission from the Deputy Director of Public Instructions (DDPI)
↓
Pilot test to check the validity and reliability of the methodology
↓
Target population was 12 year old school children of Mysuru district
↓
Derived 12 year old children population from the whole population of higher primary school list with reference to the list provided by DDPI.
↓
Sample size estimation according to sample size formula for prevalence study.
↓
Two stage sampling technique carried out.
↓
Main survey carried out.

Figure 2- Flow chart of the methodology

3.5 Eligibility criteria

Inclusion criteria-
1. Children of 12 year old in the sampled schools.
2. Children who provided both informed consent from parents and informed assent to participate in the study.

Exclusion criteria-
2. Children undergoing orthodontic therapy.
3. Rampant caries
4. Any other craniofacial anomalies and syndromes.

3.6 Ethical considerations

Prior permission to conduct the survey was taken from the Deputy Director Public Instructions (DDPI) and also from the concerned school authorities (Annexure i). The survey protocol was reviewed and approved by the Institutional Review Board (JSS Dental College & Hospital) as enclosed in Annexure ii.

Informed consent and Informed Assent was given a week prior to the parents of the child and the child. Only those children who provided both informed
assent and consent were included in the survey. A copy of informed consent and informed assent is attached (Annexure iii and iv)

3.7 Data collection

To assess the normative orthodontic treatment need, DHC of the IOTN was used. Among the 7 taluks of Mysuru district, 4 taluks were selected. The selected taluks were,

1) Mysuru
2) Nanjangud
3) Hunsur
4) T. Narasipura

The examination was carried out under bright day light in the school premises. Sufficient sterilized instruments were carried out to the school on the day of examination (Figure 3, 4 and 5).

Figure 3- Study area and target population.
Figure 4- Autoclaved Instrument for dental examination

Figure 5- Assessment of Normative Orthodontic treatment need.
A brief note about the INDEX OF ORTHODONTIC TREATMENT NEED-

The Index of Orthodontic Treatment Need was given by Brook & Shaw in 1989. It was earlier called as Index of Orthodontic Treatment Priority which was later called as ‘IOTN’. It is a clinical index which is used to compare populations and prioritize the treatment needs.

IOTN index is a modification of Swedish Dental Health Board which was used to record malocclusion on functional grounds.

The IOTN index is one of the commonly used indices which is quantitative in type and is used assessing the Orthodontic treatment need among children and adults. There are two components of IOTN and they are the Dental Health Component (DHC) which is a clinical component and an Aesthetic Component (AC).

A) DENTAL HEALTH COMPONENT (DHC)

Swedish Medical Health Board (SMBI) is an index which was the basis for development of DHC of IOTN. The DHC indicates the clinical aspect of IOTN which records need for orthodontic treatment on dental and oro-functional grounds. DHC of IOTN has grades ranging from grade one, ‘no need’, to grade five, ‘very great need’. A grade is allocated according to the severity of the worst occlusal trait. The hierarchical scale in descending order is used for recording the worst occlusal trait.

Hierarchical scale:
1. Missing teeth (including aplasia, displaced & impacted teeth)
2. Overjets (including reverse sagittal overjets)
3. Crossbites
4. Displacements
5. Overbites

Pneumonic acronym: MOCDO

The hierarchical scale has two components:

i) The dentition is assessed systematically, thus ensuring that all relevant occlusion anomalies are recorded.

ii) If two or more occlusal anomalies are of the same DHC grade, the most severe one is scored.

(Refer Annexure v)

To record the DHC, a specially designed ruler is used (Annexure vi).

B) THE AESTHETIC COMPONENT (AC)

The Aesthetic component consists of 10 point scale illustrated by a series of photographs displaying anterior teeth in varying arrangements. (Refer Annexure vii)
THE MODIFIED IOTN\textsuperscript{85}.

Even though the IOTN index was a reliable and valid occlusal index, its usage was limited due to its complexity. Therefore, modified IOTN index was developed in order to simplify in identifying the people who needs orthodontic treatment. The development of IOTN index further helped in conducting epidemiological surveys as it was reliable and valid apart from being simple to use.

In our survey we have used the modified IOTN index with grades varying from Little/no need, Moderate need, Definite need.

To know the \textbf{Perceived Orthodontic treatment need}, the AC of the IOTN index was used. The children were given 10 coloured photographs of anterior teeth displaying various forms of malocclusion and were asked to pick photograph on the aesthetic scale most closely resembled their own dentition. The children were shown a face mirror initially which was later removed so that they refreshed the memory. The children were not allowed to look into the mirror while viewing the photograph (Figure 6 and 7).

\begin{figure}[h]
\centering
\includegraphics[width=0.5\textwidth]{image}
\caption{Self-examination by the child.}
\end{figure}
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Figure 7- Child picking the photograph closely matching his dentition.

The scores of the child’s AC score gave the perceived oral aesthetic score for each child.

To determine the Normative Orthodontic treatment need, in our study we have used the Modified version of IOTN index. The subjects were carefully examined. A single Orthodontist carried out the examination. Type III examination as recommended by the American Dental Association, which includes inspection using mirror and a probe, done under good illumination was conducted. The examination was performed under natural light in the school premises using disposable gloves, mouth mirrors. A periodontal probe was used for millimeter measurement. Sufficient number of autoclaved instruments will be carried to the examination site to avoid the interruption during the study.

For each of these two assessment tools, IOTN DHC, IOTN AC, patients were categorized into 3 groups as having, (Table 3) -

1) Little / no orthodontic treatment need.
2) Moderate orthodontic treatment need.
3) Definite orthodontic treatment need.

<table>
<thead>
<tr>
<th>Table 3- Levels of Treatment need.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<tr>
<td>IOTN DHC</td>
</tr>
<tr>
<td>IOTN AC</td>
</tr>
</tbody>
</table>

At the end of the clinical examination, a school oral health education lecture was given to all the children in the school to create awareness about Dental health and Orthodontic treatment.
3.8 Data entry

At the end of each day of the survey, the data were entered to the personal computer by the investigator. The data was verified and were scrutinized at the end of each week for any wrong entries. Data were coded and entered into excel sheet. To maintain the data quality rechecking and cross checking were done during data entry phase. 10% of the observations were randomly selected and cross-checked to detect any error and to validate the data entry. At the end of the survey, the data were scrutinized again and was handed over to the Statistician.

Statistical Analysis-Data were transformed into SPSS Windows version 16, where cleaning, coding, recoding, cross-checking, and processing and analysis were done by the statistician.

The following statistical tests were applied.
1. Frequency
2. Descriptive
3. Cross-tabulations (Contingency table analysis)
4. Chi-square test.
5. Kappa statistic.
6. Poisson regression
7. Negative binomial regression

All the statistical methods were carried out through the SPSS for Windows (version 16.0)

3.9 GIS Mapping

The Base Map creation:

The Base Map for the study is a district and taluk outer boundary layer that was created for Mysuru district and taluks of Myuru, Hunsur, Nanjangud and T-Narsipur. The individual taluk maps and the district map was merged together to create the overall study area map. The information on Normative orthodontic treatment need, Perceptive orthodontic treatment need and frequency of different types of malocclusion for each taluk and for Mysuru district was incorporated into the baseline map and the maps depicting the differences in the normative orthodontic treatment need, perceptive orthodontic treatment need and the frequency of different types of malocclusion for each taluk and the Mysore district was created using Arc GIS software.

The maps thus created provides a visual display of normative and perceptive orthodontic need along with frequency of different types of malocclusion which helps in better planning of dental health services.