PREVALENCE AND ORTHODONTIC TREATMENT NEEDS USING DAI IN 12 TO 14 YEARS OLD SCHOOL CHILDREN IN NALGONDA DISTRICT OF TELANGANA STATE, INDIA

Dr.Enaganti Srinivasulu[1], Dr. Raju Jakkula[2], Dr.G.R.Raveendra Varma[3], Dr. Shaik. Asma sultana[4], Dr.Suresh Chinnakutti[5]

[1]MDS (Orthodontics and Dentofacial Orthopaedics), Assistant Professor,Govt. Dental College &Hospital, Afzalgunj, Hyderabad, Telangana., India.
[2](M D S), Department of Orthodontics and Dentofacial Orthopaedics, Senior lecturer, St Joseph Dental College and Hospital, Duggirala, Eluru
[3](M D S), Department of Orthodontics and Dentofacial Orthopaedics, Senior Lecturer, KIMS Dental College and Hospital, Amalapuram
[4]MDS, Department of Oral Medicine and Radiology, Assistant Professor, Care Dental College, Guntur
[5]Assistant Professor, Department of Oral and Maxillofacial Surgery, Vinayaka Mission's Sankarachariyar Dental College, Vinayaka Mission's Research Foundation(Deemed To Be University), Salem, Tamilnadu, India.

Abstract:

Introduction: The objective of this study was to evaluate the orthodontic status and treatment need of school children in Nalgonda district, Andhra Pradesh, using Dental Aesthetic Index. Malocclusion is a deformity afflicting the human population since ages. It is essential to know the prevalence of malocclusion in any society, as it reveals the true extent of the problem and guides in tackling it. The general public can, then, be educated on widespread occurrence of malocclusion and its deleterious effects, so that appropriate preventive and corrective measures can be instituted.

Materials and Methods: Among the 69 schools of Nalgonda town, six schools were selected using simple random sampling technique. All the children in the age group of 12 - 14 years who fulfilled the inclusion and exclusion criteria were considered for examination. The students were picked until the sample size of 1000 was reached. The information on orthodontic status was obtained using Dentofacial Anomalies with the criteria of Dental Aesthetic Index (W H O Oral Health Assessment form 1997).

Results: The prevalence of definite, severe, and very severe malocclusion was higher among females than males, and this difference was statistically significant.

Conclusions: 86.1% of the study subjects had DAI score of less than 25, indicating minor malocclusion, suggesting 'no treatment'.

Key words: Malocclusion, DAI, Nalgonda, Orthodontic treatment needs, Young permanent dentition, Awareness of orthodontic treatment

4066

Introduction:

Oral health is an essential component of health throughout life. Oral cavity is associated with the development of healthy personality, perceptions and the overall experiences of pleasure. Incidentally epidemiological investigations on occlusion in the permanent dentition have become difficult since significant part of the population cannot be recorded because of orthodontic treatment [1]. Public Dental Health has been defined as "the science and art of preventing and controlling dental diseases and promoting dental health through community effort" (American Dental Association) [2]. According to Dr.G.Dale [3], if deciduous teeth are retained beyond time of exfoliation, they are known to cause delay in eruption of permanent teeth and thus lead to malocclusion and other orthodontic problems which will then need expensive corrective measures. The evaluation of different types of malocclusions existing within a population is important in order to plan orthodontic measures and determine the resources required for the service [4].

Measuring and recording the severity and prevalence of malocclusion is not only important for evaluating the occlusal status of subjects in a community and establishing the treatment priority, but it can be used as an epidemiological tool for preventive procedures or for training orthodontic specialty[5]. A systematic and well organized dental care programme for any target population in a community requires some basic information such as the prevalence of the condition. In more developed part of the world where the specialty of orthodontics has been established, adequate basic information is available [6]. In developing nations such information can be lacking. It is essential to know the prevalence of malocclusion in any society, as it reveals the true extent of the problem and guides in tackling it. The general public can, then, be educated on widespread occurrence of malocclusion and its deleterious effects, so that appropriate preventive and corrective measures can be instituted. The present study was undertaken in an attempt to provide reliable quantitative information regarding the prevalence and severity of malocclusion at specific ages in the school going children of Nalgonda population.

Materials and methods:

Selection of study participants

The information on the total number of schools in Nalgonda town was obtained from the office of District Education Officer, Nalgonda. Among the 69 schools of Nalgonda town, six schools were selected using simple random sampling technique. Among the schools selected all the children aged 13-15 years were selected until the sample size reached 200.

Children with gross facial asymmetry, variable path of closure of mandible, developmental deformities, history of orthodontic treatment, abnormalities in tooth size shape and number. The information on orthodontic status was obtained using Dentofacial Anomalies with the criteria of Dental Aesthetic Index (WHO Oral Health Assessment form 1997). The examination of the children was done in natural daylight using a mouth mirror and CPI probe on a foldable chair. Portable torch was used, whenever required, for proper illumination.

Statistical analysis:

The SPSS statistical Package for Social Sciences, version 16 was used. The Dental Aesthetic Index value was computed using the regression co-efficient formula mentioned in Oral Health Surveys, Basic Methods, 4th edition, World Health Organization, Geneva.

The regression formula is as under:

DAI = Missing teeth X 6 + Crowding + Spacing + Diastema in millimeters X 3 + Largest Anterior Maxillary Irregularity + Largest Anterior Mandibular Irregularity + Anterior maxillary Overjet X 2 + Anterior Mandibular Overjet X 4 + Vertical anterior Open bite X 4 + Antero posterior molar relation X 3 + 13

Statistical tests employed:

The mean Dental Aesthetic Index score between two samples was tested using either Unpaired t – test (Parametric) or Mann-Whitney U test (Non parametric). The mean Dental Aesthetic Index score between more than two samples was tested using either One way ANOVA (Parametric) or Kruskal – Wallis test (Non parametric). The categorical

4067

information or qualitative data was analyzed using Chi – square test or other relevant statistical tests. The statistical significance was fixed at 0.05 level.

Results:

The study examined the prevalence and severity of malocclusion in a sample population using the Dental Aesthetic Index (DAI) score. Among the participants, 86.1% had a DAI score of less than 25, indicating minor malocclusion, while 10%, 3%, and 0.9% had scores of 26-30, 31-35, and 36 or more, respectively, suggesting definite, severe, and very severe malocclusion. The prevalence of definite, severe, and very severe malocclusion was higher among females than males, and this difference was statistically significant. Table 1-3

The study yielded several significant outcomes (p<0.01) related to the prevalence and severity of malocclusion in the sample population:

1. Prevalence of Malocclusion: About 86.1% of the participants exhibited minor malocclusion, while 10%, 3%, and 0.9% had definite, severe, and very severe malocclusion, respectively. These findings underscore the need for assessing and addressing malocclusion in the population.

2. Gender Differences: The study found that females had a higher prevalence of definite, severe, and very severe malocclusion compared to males. Additionally, females showed higher mean scores for anterior maxillary and mandibular irregularities, diastema, and crowding in the arches compared to males. These gender differences highlight the importance of considering sex-specific orthodontic interventions.

3. Age Group Variations: The prevalence of definite, severe, and very severe malocclusion increased with age. This emphasizes the significance of early orthodontic evaluation and intervention, as malocclusion tends to worsen with increasing age.

4. Missing Anterior Teeth: About 10% of the study population had one or more missing anterior teeth, with a higher prevalence in the 13 and 14 years age groups. This finding emphasizes the importance of addressing missing teeth early to maintain dental health and function.

5. Crowding and Spacing: Females had a higher prevalence of crowding in the arches, while males had a higher prevalence of spacing in the incisal segments. The prevalence of crowding decreased with age, while the prevalence of spacing was higher in the 13 years age group. These findings highlight the need for tailored orthodontic treatments based on specific malocclusion features.

6. Maxillary and Mandibular Irregularity: Females had higher mean scores for anterior maxillary and mandibular irregularities compared to males. These irregularities may have implications for aesthetics and functional outcomes and may require appropriate orthodontic management.

4068

Table 1: Distribution of DAI (Dental Aesthetic Index) scores between males and females in the study

DAI scores	Males	Females	Total
<25 (Minor abnormality or No malocclusion)	486(56.4%)	375(43.6%)	861(100%) (86.1%)
26-30 (Definite malocclusion)	43(43%)	57(57%)	100(100%) (10%)
31 – 35 (severe malocclusion)	7(23.3%)	23(76.3%)	30(100%) (3%)
36 and above (very severe or Handicapping malocclusion)	1(11.1%)	8(88.9%)	9(100%) (0.9%)
Total	537(53.7%)	463(46.3%)	1000(100%) (100%)

X^2 = 24.908, df = 2, p=0.000 (HS)

Table 2: Distribution of mean DAI (Dental Aesthetic Index) scores between males and females in the study

Gender	Mean	S D
Male	20.63	3.54
Female	21.99	5.12
t- value = -4.964, df=998, P= 0.000(HS)		

Table 3: Distribution of DAI (Dental Aesthetic Index) scores between different age groups in the study

DAI scores	12 years	13 years	14 years	Total
<25 (Minor abnormality or No malocclusion)	415(48.2%)	284(33%)	162(18.8%)	861(100%)
26-30 (Definite malocclusion)	25(25%)	39(39%)	36(36%)	100(100%)
31 – 35 (severe malocclusion)	4(13.3%)	15(50%)	11(36.7%)	30(100%)
36 and above (very severe or Handicapping malocclusion)	2(22.2%)	2(22.2%)	5(55.6%)	9(100%)
Total	446(44.6%)	340(34%)	214(21.4%)	1000(100%)
X^2 = 43.146, df = 6, p=0.000 (HS)				

4069

Discussion:

Using the Dental Aesthetic Index (DAI) score, the current study sought to determine the prevalence and orthodontic treatment needs among 12 to 14-year-old schoolchildren in Nalgonda district, Telangana State, India. The study produced a number of noteworthy findings that shed light on the prevalence of malocclusion in this population and the possible consequences for orthodontic treatment.

Concern should be expressed about the significant rate of malocclusion in the research cohort. A little over 86.1% of the participants had modest malocclusion, while only 0.9%, 0.3%, and 0.0% of them had very severe malocclusion. These results show that the majority of kids have some degree of malocclusion, highlighting the urgent need for early orthodontic screening and care. Minor malocclusions may worsen if left untreated, affecting dental health, appearance, and general quality of life.

When creating orthodontic treatment programmes, gender differences in malocclusion prevalence should be taken into account. Females showed a higher prevalence of definite, severe, and very severe malocclusions as well as higher mean scores for diastema, crowding in the arches, and anterior maxillary and mandibular abnormalities. These results emphasise possible sex-specific malocclusion variations and imply that females may need greater care when it comes to orthodontic treatment. Further research is necessary to determine whether these variations are caused by skeletal growth patterns and hormonal changes during puberty.

Early management is crucial because of the correlation between ageing and a higher prevalence of malocclusion. The study discovered that as participants aged, the proportion of them who had definite, severe, or very severe malocclusion increased. If not corrected, the differences in jaw size, tooth eruption, and alignment may get worse as

kids get older. Therefore, early orthodontic evaluation is essential for identifying and starting the right treatment at the right time, avoiding potential issues and lowering treatment complexity.

The discovery that one or more anterior teeth were missing in 10% of the population suggests a significant dental health issue. Speech, chewing, and facial harmony can all be negatively affected by missing teeth, in addition to other practical and aesthetic problems. The higher occurrence of missing teeth in the 13 and 14-year-old age groups raises the possibility of congenital absence of permanent teeth or delayed eruption of those teeth. The planning of orthodontic therapy, which may include space maintenance or tooth replacement alternatives to restore optimal function and aesthetics, can be guided by early detection of missing teeth.

The gender-related effects on dental arch dimensions and tooth alignment are highlighted by the observed disparities in crowding and spacing between males and girls. Males showed a larger incidence of spacing in the incisal segments whereas females showed a higher prevalence of crowding in the arches. In order to get the best results, orthodontic treatment programmes should take these gender-specific patterns into consideration. These patterns may be influenced by genetic and environmental variables.

In the incisal segments, the prevalence of crowding reduced with age whereas the prevalence of spacing increased in the 13 years and older age group. Growth patterns and teeth eruption could be the causes of these aging-related phenomena. Existing crowding may somewhat lessen as permanent teeth erupt and dental arches enlarge with age, which results in a larger prevalence of space in the incisal segments.

Females had significantly higher mean scores for front maxillary and mandibular abnormalities than did males. The alignment and location of the anterior teeth may be impacted by these anomalies, which could have an aesthetic and occlusal stability impact. By correcting these deviations, orthodontic procedures can improve the harmony and functionality of the face. Less crowding was observed in females than in boys when compared to Sven Helm's [7] study, and greater crowding was observed in the lower arch than the upper arch in both sexes. According to Louis J. Baume's study [8], crowding was one of the characteristics of malocclusion that was relatively the most common. In two villages in the state of Haryana, AA Singh et al.'s [9] study discovered crowding in the maxillary anterior area (5.4%). The difference could be caused by the fact that our study's index was different from theirs. In a research by Farahani AB et al [10] utilising DAI, it was discovered that 10.8% of the mandible and 16.7% of the maxilla had severe crowding. This was different from our findings since Nalgonda has more mandibular crowding. The spacing in the upper arch was shown to be greater in boys than in girls in a study by Sven Helm [7], which is comparable to our investigation. When compared to our investigation, which found spacing in 14.5% of the individuals, Tschill P et al's [1] study found spacing in 67.5% of the subjects. 1.6% of the patients had maxillary diastema, which was higher than the 0.3% prevalence of true mandibular diastema, according to SM Hashim Nainar and N Gnanasundaram [11]. Overjet greater than 3.5mm was most frequently detected in early mixed dentition, according to Tausche et al [12].

Males and females, as well as different age groups, did not significantly differ in their maxillary overjet, mandibular overjet, vertical anterior open bite, or molar relation scores, according to the study. These results imply that in this study population, these specific parameters might not exhibit gender- or age-related differences.

The clinical importance of these findings must be carefully considered despite the significant prevalence of malocclusion in this cohort. The DAI score measures cosmetic impairment as opposed to functional issues, and not all malocclusion instances necessitate orthodontic intervention. The choice to begin orthodontic treatment should be made after a thorough evaluation that takes into account the DAI score as well as other clinical

4070

variables, the patient's functional requirements, and psychosocial aspects.

The cross-sectional design of the study, which offers a snapshot of malocclusion prevalence at a particular period, is one of its limitations. The natural development of malocclusion over time would be better understood through longitudinal investigations. The study was also restricted to a particular age group and geographical area, thus the results may not be entirely generalizable to other populations.

Conclusion:

In conclusion, the present study highlights the high prevalence of malocclusion among 12 to 14-year-old school children in Nalgonda district, Telangana State, India. Gender-specific differences in malocclusion and dental irregularities underscore the importance of considering sex-specific treatment approaches. Early orthodontic evaluation and intervention are crucial to address malocclusion promptly and achieve optimal treatment outcomes. Further research is needed to explore the long-term implications of malocclusion in this population and to develop evidence-based strategies for effective orthodontic treatment and management.

References:

1. Tschill P et al: Malocclusion in the deciduous dentition of Caucasian children: Eur J Orthod; vol 19; 1997:361-367.

2. Jose A, Joseph M R : Prevalence of dental health problems among school going childrenin rural Kerala :Department of Community Medicine,M.O.S.S. Medical CollegeKolenchery.

3. Dale G: Guidance of Occlusion: Serial Extraction. In Graber Y.M., Swain.B.F.eds. Orthodontic Current Principles and Technique. St.Louis: C. V. Mosby Company,1985; 284-295.

4. Emmanuel O.Ajayi: Prevalence of Malocclusion among school going children in Benin City, Nigeria: A Peer-review Journal of Biomedical Sciences: vol.7; Nos.1 & 2: 2008.

5. TulinUgur, SemraCiger, Ata Aksoy and Asli Telli: An epidemiological survey using theTreatment Priority Index (TPI): Eur J Orthod; vol 20: 1998; 189-193.

6. Onyeaso CO : Prevalence of malocclusion among adolescents in Ibadan, Nigeria, :Am JOrthod Dentofacial Orthop;vol.126 ; 5(2004);604-607.

7. Sven Helm. Malocclusion in Danish children with adolescent dentition: An epidemiologicstudy; Am J of Orthod, Vol.54; may1968: 352-366.

8. Baume LJ; Uniform methods for the epidemiologic assessment of malocclusion: Resultsobtained with the World Health Organization standard methods (1962 and 1971) in SouthPacific populations. : Am J Orthod; vol.66; issue.3; sepember-1974; 251-272.

9. AA Singh et al ; Malocclusion and its traits in rural school children ;Journal of Indian Orthodontic Society ;vol.31; 1998; 76-80

10. Farahani AB et al: Malocclusion and occlusal traits in an urban Iranian population. Anepidemiological study of 11- to 14-year-old children; Eur J Orthod: May 28, 2009.

11. S.M. Hashim Nainar and N. Gnanasundaram : Incidence and etiology of midline diastemain a population in South India(Madras) ; Angle Orthodontist ; vol 59; No.4 ;1988 ;277-282.

12. Nisula KK et al ; Occurrence of malocclusion and need of orthodontic treatment in rarelymixed dentition ; Am J Orthod Dentofacial Orthop; 125(3); 2004 March; 20A.

13. Tausche E, et al; Prevalence of malocclusion in the mixed dentition and Orthodontic treatment need; European Journal of Orthodontics; vol 26; 2004; 237-244.

4072