

Assessment of Malocclusion and Orthodontic Treatment needs Among 13- to 15-year-old School-going Children of Bengaluru North 4: A Cross-sectional Study

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ABSTRACT

Background: Malocclusion has a profound influence on individual's appearance and quality of life. Knowledge about the prevalence and severity of malocclusion is important for early diagnosis and planning of orthodontic services.

Objective: To assess the prevalence of malocclusion and orthodontic treatment needs among school-going children in Bengaluru North 4, Karnataka, India.

Materials and methods: A descriptive cross sectional study was conducted among one thousand and one hundred and eleven 13–15 year old urban English medium school children of Bengaluru North 4. Data regarding assessment of prevalence of malocclusion and orthodontic treatment needs were collected by using Dental Aesthetic Index (DAI).

Results: Data were analyzed using Chi-squared test and one-way analysis of variance test. Prevalence of malocclusion was 32.5%; 14-year-olds had the highest mean DAI score (24.81) as compared with 13-year-olds (24.42) and 15-year-olds (23.70) and the difference among the study population was statistically significant ($p < 0.05$). Males had slightly higher

mean DAI scores (24.51 ± 5.502) than females (24.13 ± 5.742). Of all the 10 components of DAI, a statistically significant difference existed in the anterior maxillary overjet, with 14-year-olds showing the highest prevalence ($p < 0.05$).

Conclusion: A higher prevalence of malocclusion was observed among 14-year-old males and higher perception of dental esthetics among 15-year-old male population. The baseline information outlined in the present study can be appropriately utilized for the future planning to meet the orthodontic treatment needs among the population.

Keywords: Adolescents, Cross-sectional study, Dental aesthetic Index, Malocclusion, Orthodontic treatment needs, Prevalence, Schoolchildren.

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INTRODUCTION

In India, children form about 38 to 40% of its 1,090 million total population, and 85% of them have high levels of dental disease.¹ It is reported that about 35% of children suffer from maligned teeth and jaws affecting their proper functioning.² Children who suffer from pain of dental origin are more likely to have more restricted-activity days including missing school than those who do not. In worldwide Public Health Dental Disease Priorities, malocclusion features the third highest in prevalence.³

Malocclusion is not a disease but a disability.⁴ Frances C Macgregor⁵ stated that "a disfiguring malocclusion is a physical handicap since it limits a person's social stereotype and opportunities." Malocclusion may elicit unpleasant social reactions and a poor self-concept. If the malocclusion is not diagnosed at an early stage and appropriate preventive and corrective measures are not implemented in time, it might progress to severe form of malocclusion, which might end up in more time-consuming, expensive, and complicated orthodontic treatment.

Salzman⁶ had rightly stated, “The epidemiological determination of a disease is the first step in public health endeavors.” The Dental esthetic Index (DAI), developed in the United States by Cons et al,⁷ has been adopted by the World Health Organization (WHO) as a cross-cultural index. The WHO in 1997 in its Basic Methods for Oral Health Surveys⁸ incorporated the DAI criteria for assessing dentofacial anomalies. It is relatively easy to use and identifies deviant occlusal traits and links clinical and esthetic components of occlusion, including patient perception mathematically to produce a single score. The DAI also aims to predict the clinical judgments of orthodontists by separating handicapping and nonhandicapping malocclusions.⁹ Knowledge about the prevalence and frequency of different types of malocclusion and the need for orthodontic treatment is important for planning of an orthodontic service and is essential in assessing resources required. Moreover, malocclusion has not been thoroughly investigated because the related pain and misery are seldom acute.

In view of all the above, it seemed necessary to carry out a study like the one proposed here, in order to assess the prevalence of malocclusion, orthodontic treatment needs among 13- to 15-year-old school-going children in Bengaluru North 4.

MATERIALS AND METHODS

Brief Profile of Study Area

The present study was conducted in Bengaluru, capital of the southern Indian State of Karnataka, India. Bengaluru is the third most populous city in India and the 18th most populous city in the world. The population of Bengaluru was estimated to be 9,621,551 in 2011.¹⁰ For administrative convenience, schooling system in Bengaluru city is divided into three zones – Bengaluru South, Bengaluru North, and Bengaluru Rural. Bengaluru North is further divided into four zones – North 1, North 2, North 3, and North 4 (Flow Chart 1).

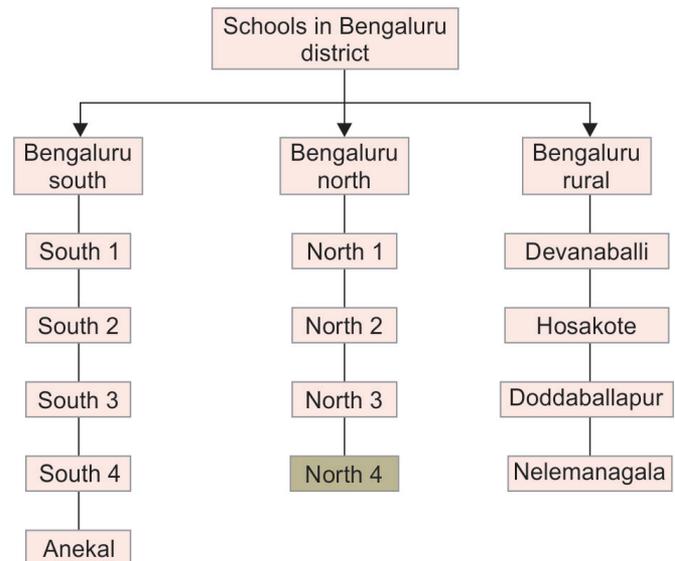
Study Design and Study Population

A descriptive cross-sectional study was conducted from November 2013 to February 2014 among 13- to 15-year-old school-going children of Bengaluru North 4, India. Children with mixed dentition, craniofacial anomalies (clefts and syndromes), and who were undergoing or had a history of orthodontic treatment were excluded.

Pilot Study

A pilot study was conducted on a sample of 100 school-going children selected from one school. This was done to determine the feasibility of the study, the applicability and accuracy of the DAI,⁷ and to determine the amount of time required for examination of each subject.

Flow Chart 1: Distribution of schools in Bengaluru district



Sample Size Formula and Determination

The sample size determination was carried out using the formula,

$$n = \frac{Z_{\alpha}^2(1-p)}{E^2p}$$

where Z_{α} = Standard deviate at 95% (1.96 for 0.05 α)

p = Prevalence of diseases (15%)

E = Variation (15%)

A 10% chance for nonresponse from the study subjects was expected. Thus the sample size was rounded off to 1,100 subjects.

Sampling Technique

Before the inception of the study, the list of the schools was obtained from the Bengaluru North 4 Education Board. Bengaluru North 4 zone was obtained using the lottery method. A total of 159 schools were selected using simple random sampling technique. The schools granting permission to conduct the interview and oral examination were included in the study. On the day of interview and oral examination study subjects who satisfied the inclusion criteria were selected from each school using simple random method. The procedure was continued until the required sample was obtained. The 1,111 school-going children were enrolled from 15 schools across Bengaluru North 4.

Ethical Clearance, Official Permission, and Informed Consent

Ethical clearance was obtained from the Institutional Review Board. The study was conducted in accordance

with the Deceleration of Helsinki. The required official permission to select, examine, and collect the relevant data from selected subjects was solicited and obtained from the principals of the respective schools. Informed consent was obtained from parents/guardians of subjects after explaining the purpose and the involved procedures of the study for children.

Calibration of Examiner

The principal examiner was trained and calibrated by clinically well-experienced staff of the department. The examiner practiced the recordings on twenty 13- to 15-year-old schoolchildren and the recordings were calibrated by examiner. The same examination was repeated after 5–6 hours by the examiner; the result of the two examinations were compared and checked for intra-examiner reliability ($Kappa = 0.82$).

Collection of Data

Assessment Form

The assessment form consisted of two sections:

1. Demographic information, i.e., age, gender, and address of the school
2. Clinical parameter: Components of DAI score. The DAI was developed by Naham C Cons, Joanna Jenny, and Frank J Kohout in the year 1986.⁷

Clinical Examination

Data were collected by a single examiner. The examiner visited the schools on predetermined dates according to schedule. Malocclusion and orthodontic treatment needs were assessed by using DAI.^{7,8} Type-III clinical examination of the study subjects was conducted using Community Periodontal Index probes and plane mouth mirrors under adequate natural light in school premises. To reduce the examiner's bias, duplicate examination was conducted on 5% ($n = 36$) of the population during the course of study. After the oral examination, an oral health education program was conducted by the examiner for all the study subjects using audiovisual aids.

Feedback and Referral

The findings of the study were reported to the respective school authorities and the schoolchildren requiring treatment were referred to the Krishnadevaraya College of Dental Sciences and Hospital, Bengaluru.

Statistical Analysis

The data was entered into the spreadsheet (MS Excel) and was subjected to statistical analysis using Statistical Package for the Social Sciences version 11.5. From the

collected data, the frequencies, percentages, means, and standard deviations were calculated. The prevalence of malocclusion was calculated using the standard DAI regression equation. The descriptive statistics of the key variables were calculated using Pearson's Chi-square and one-way analysis of variance test. Statistical significance was set at $p < 0.05$ for the study.

RESULTS

Distribution of Study Subjects

The study population consisted of a total of 1,111 school-going children of whom 370 (33.3%), 396 (35.6%), and 345 (31.1%) belonged to the age groups of 13, 14, and 15 years respectively. Among them, 596 (53.6%) were males and 515 (46.4%) were females (Table 1).

Distribution of DAI Components by Age

It was observed that of the total study population, none of the study subjects had missing anterior teeth; 14-year-old children had higher prevalence of incisal crowding (219 [53.3%]) than 13- and 15-year-olds (193 [52.2%], 174 [50.4%]). There were 73 [19.7%], 80 [20.2%], 82 [23.8%] 13-, 14-, and 15-year-old children with incisal segment spacing. A total of 46 (12.4%) 13-year-old, 39 (9.8%) 14-year-old, and 39 (11.3%) 15-year-old children had a midline diastema of ≥ 1 mm. Largest anterior mandibular irregularity of ≥ 1 mm was present in 77 (20.8%) 13-year-old, 103 (26.0%) 14-year-old, and 74 (21.4%) 15-year-old children. A total of 100 (27.0%) 13-year-old, 131 (33.1%) 14-year-old, and 118 (34.2%) 15-year-old children had largest mandibular irregularity of ≥ 1 mm. Anterior maxillary overjet of > 3 mm was observed in 99 (36.9%), 103 (38.4%), 66 (24.6%) 13-, 14-, and 15-year-old children respectively; 3 (8.2%) 13-year-old, 4 (1.0%) 14-year-old, and 3 (0.9%) 15-year-old children had an anterior mandibular overjet of ≥ 1 mm. Vertical anterior open bite of ≥ 1 mm was observed in 1 (0.3%), 6 (1.5%), 6 (1.7%) 13-, 14-, and 15-year-old children. Half or full cusp deviation from normal molar relation was higher among

Table 1: Distribution of study subjects according to age and gender

Variable	n	%
<i>Age group (years)</i>		
13	370	33.3
14	396	35.6
15	345	31.1
Total	1,111	100.0
<i>Gender</i>		
Male	596	53.6
Female	515	46.4
Total	1,111	100.0

Table 2: Distribution of DAI components by age

DAI components	13 years (n = 370)		14 years (n = 396)		15 years (n = 345)		Total (n = 1,111)		p-value
	n	%	n	%	n	%	n	%	
Missing anterior teeth ≥ 1	0	0	0	0	0	0	0	0	–
Incisal segment crowding ≥ 1	193	52.2	219	55.3	174	50.4	586	52.7	0.401
Incisal segment spacing ≥ 1	73	19.7	80	20.2	82	23.8	235	21.2	0.354
Midline diastema (mm) ≥ 1	46	12.4	39	9.8	39	11.3	124	11.2	0.522
Largest anterior maxillary irregularity (mm) ≥ 1	77	20.8	103	26.0	74	21.4	254	22.9	0.174
Largest anterior mandibular irregularity (mm) ≥ 1	100	27.0	131	33.1	118	34.2	349	31.4	0.080
Anterior maxillary overjet (mm) ≥ 3	99	36.9	103	38.4	366	24.6	268	24.1	0.008*
Anterior mandibular overjet (mm) ≥ 1	3	8.2	4	1.0	3	0.9	10	0.9	0.956
Vertical anterior open bite (mm) ≥ 1	1	0.3	6	1.5	6	1.7	13	1.2	0.138
Anterior posterior molar relation ≥ 1	319	86.2	345	87.1	299	86.7	963	86.7	0.934

*Statistically significant

14-year-old children (345 [87.1%]). Among 13- and 15-year-old children, 319 (86.2%) and 299 (86.7%) had half or full cusp deviation from normal molar relation.

It was observed that of all the 10 components of DAI, a statistically significant difference existed in the anterior maxillary overjet, with 14-year-olds showing the highest prevalence ($p < 0.05$) (Table 2).

Distribution of DAI Components by Gender

It was observed that of the total study population, none of the study subjects had missing anterior teeth. A total of 311 (52.2%) male and 275 (53.4%) female children had incisal segment crowding. There were 128 (21.5%) male and 107 (20.8%) female children with incisal segment spacing. A total of 71 (11.9%) male and 53 (10.3%) female children had a midline diastema of ≥ 1 mm. Largest anterior mandibular irregularity of ≥ 1 mm was present in 121 (20.3%) male and 133 (25.8%) female children; 197 (33.1%) male and 152 (29.5%) female children had largest mandibular irregularity of ≥ 1 mm. total of 43 (53.4%) male and 125 (46.6%) female children had an anterior maxillary overjet of > 3 mm; 7 (1.2%) males and 3 (0.6%) females had an anterior mandibular overjet of ≥ 1 mm; 5

(0.8%) male and 8 (1.6%) female children had a vertical anterior open bite of ≥ 1 mm; 520 (87.2%) male and 443 (86.0%) female children had half or full cusp deviation from the normal molar relation.

It was observed that of all the 10 components of DAI, largest anterior maxillary irregularity was significantly higher in the female subjects as compared with male subjects ($p < 0.05$) (Table 3).

Prevalence of Malocclusion and Orthodontic Treatment Needs of Study Subjects

It was observed that of 1,111 school-going children examined, 751 (67.6%) had DAI scores of ≤ 25 with no abnormality or little malocclusion requiring no or slight orthodontic treatment, 214 (19.3%) had DAI scores of 26–30 with definite malocclusion requiring elective orthodontic treatment, 94 (8.5%) had DAI scores of 31–35 with severe type of malocclusion requiring highly desirable orthodontic treatment, 52 (4.7%) had DAI scores of ≥ 36 with very severe or handicapping malocclusion requiring mandatory-type orthodontic treatment. The prevalence of malocclusion among the study subjects was 32.5% (Table 4 and Graph 1).

Table 3: Distribution of DAI components by gender

DAI components	Male (n = 596)		Female (n = 515)		Total (n = 1,111)		p-value
	n	%	n	%	n	%	
Missing anterior teeth ≥ 1	0	0	0	0	0	0	–
Incisal segment crowding ≥ 1	311	52.2	275	53.4	586	52.7	0.685
Incisal segment spacing ≥ 1	128	21.5	107	20.8	235	21.2	0.776
Midline diastema (mm) ≥ 1	71	11.9	53	10.3	124	11.2	0.392
Largest anterior maxillary irregularity (mm) ≥ 1	121	20.3	133	25.8	254	22.9	0.029*
Largest anterior mandibular irregularity (mm) ≥ 1	197	33.1	152	29.5	349	31.4	0.205
Anterior maxillary overjet (mm) ≥ 3	143	53.4	125	46.6	268	24.1	0.988
Anterior mandibular overjet (mm) ≥ 1	7	1.2	3	0.6	10	0.9	0.297
Vertical anterior open bite (mm) ≥ 1	5	0.8	8	1.6	13	1.2	0.269
Anterior posterior molar relation ≥ 1	520	87.2	443	86.0	963	86.7	0.548

*Statistically significant

Distribution of DAI Scores by Age and Gender

It was observed that among the study population, 14-year-olds had the highest mean DAI score (24.81) as compared with 13-year-olds (24.42) and 15-year-olds (23.70), and the difference among the study population was statistically significant ($p < 0.05$). No statistically significant difference ($p > 0.05$) was observed between the

mean DAI scores of male and female population (24.51 and 24.13) respectively (Table 5 and Graph 2).

DISCUSSION

In the present descriptive cross-sectional study, DAI recommended by the WHO was used to assess prevalence of malocclusion and orthodontic treatment needs since it

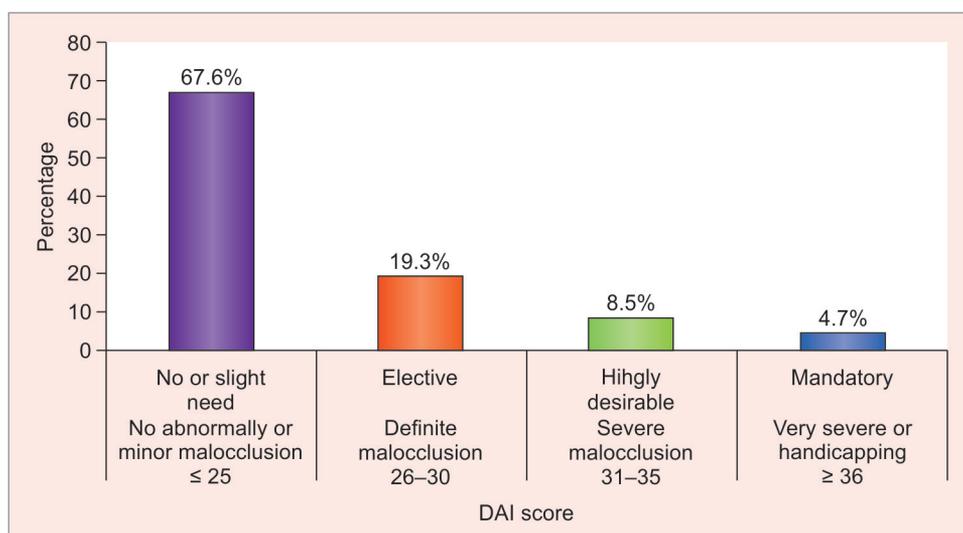
Table 4: Prevalence of malocclusion and orthodontic treatment needs of study subjects

DAI scores	Severity of malocclusion	Treatment need	Number of children n (%)
≤25	No abnormality or minor malocclusion	No or slight need	751 (67.6)
26–30	Definite malocclusion	Elective	214 (19.3)
31–35	Severe malocclusion	Highly desirable	94 (8.5)
≥36	Very severe or handicapping	Mandatory	52 (4.7)

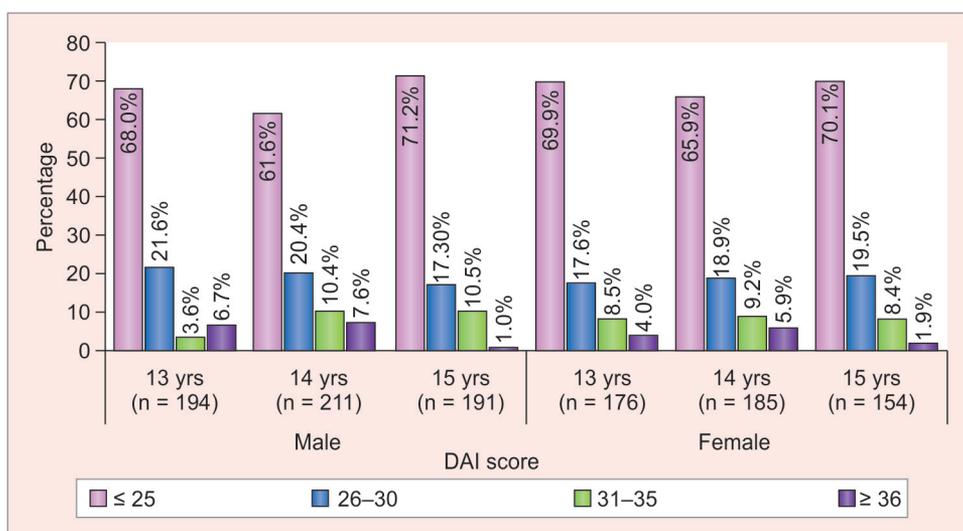
Table 5: Mean DAI scores of study population according to age and gender

Variable	n	Mean ± SD	F-value	p-value
Age (years)				
13	370	24.42 ± 5.647	3.680	0.026*
14	396	24.81 ± 6.027		
15	345	23.70 ± 5.015		
Gender				
Male	596	24.51 ± 5.502	1.265	0.261
Female	515	24.13 ± 5.742		

*Statistically significant; SD: Standard deviation



Graph 1: Prevalence of malocclusion and orthodontic treatment needs of study subjects



Graph 2: Mean DAI scores of study population according to age and gender

combines the physical and esthetic aspects of occlusion mathematically to produce a single score. It is recommended that this index be used for age groups past their mixed dentition phase, usually from 12 years.⁸ The DAI is based on socially defined esthetic standards and can be used to objectively compare occlusal status. It can be useful as a reliable and equitable indicator for malocclusion;¹¹ DAI is more versatile, time saving, and simple to use.¹²

The present study was conducted on a sample of 1,111 school children aged 13 to 15 years. Children of age group 13 to 15 years were included in the study since it is at this age the perception of dental esthetics changes and the clinical diagnosis of the type and extent of malocclusion is best made and active treatment is recommended, which can lead to successful outcomes.² It is observed that the perceived orthodontic treatment needs seem to lessen with age even if the patient does not undergo orthodontic treatment.¹³

MISSING ANTERIOR TEETH

In the present study, none of the study subjects had missing anterior teeth. The results are in contrast to other studies which showed a higher prevalence.¹⁴⁻²²

INCISAL SEGMENT CROWDING

The results of the present study indicated that 52.7% of children had incisal segment crowding. Crowding was more among 14-year-old male children. Similar results were echoed in other studies.^{17,18,20} Whereas some of the studies showed a comparatively lower prevalence,^{14-16,19,22} Baca-Garcia et al²³ reported a higher prevalence (76.8%) of incisal segment crowding.

Such a conflict in results may be related to the abnormal tooth positions and racial, genetic composition of the study groups. The high prevalence of crowding may also partly be explained by the occurrence of caries and molar extraction, which causes the migration of the first permanent molar, inclinations, and rotations.

INCISAL SEGMENT SPACING

On the whole, the incisal spacing affected 21.2% of the study population, nearing with those expounded among the similar study populations.^{15,16,18-20} In contrast, a lower prevalence of 14.5, 13.3, and 15.21% was observed by Anita et al,¹⁷ Baca-Garcia et al,²³ and Mallick et al²² respectively. This difference may be attributed to the parafunctional habits, such as thumb sucking, mouth breathing and tongue thrusting, dentoalveolar discrepancies, macroglossia, and jaw size discrepancies.

MIDLINE DIASTEMA

The prevalence of midline diastema among the study population was found to be 11.2%. This prevalence is

close to that reported for children in many similar studies.^{15,16,18-20,23} However, Anita et al¹⁷ and Mallick et al²² showed a lower prevalence of 1.6 and 3.52% respectively.

This difference could be due to microdontia, abnormal labial frenum, dilacerations of central incisor, and arch length and tooth material discrepancy. The different deleterious oral habits like mouth breathing and tongue thrusting could also be the reason for this dissimilarity.

LARGEST ANTERIOR MAXILLARY IRREGULARITY

In the present study, largest anterior maxillary irregularity ≥ 1 mm was observed in 22.9%, with females showing more prevalence than males, which is similar to those reported by Shivakumar et al¹⁵ and Damle et al.¹⁸ Higher prevalence was observed in studies by Al-Zubair,¹⁹ Tak et al,¹⁶ Baca-Garcia et al,²³ Nayak et al,²⁰ and Mallick et al²² whereas Anita et al¹⁷ showed a lower prevalence (0.2%). The difference could be attributed to genetic difference and environmental factors.

LARGEST ANTERIOR MANDIBULAR IRREGULARITY

In the present study, 31.4% of study subjects had ≥ 1 mm of mandibular anterior irregularity, which is almost similar to the results observed by Tak et al,¹⁶ whereas Baca-Garcia et al,²³ Al-Zubair,¹⁹ and Mallick et al²² showed higher prevalence. This difference could again be due to the genetic and racial composition of the study groups.

ANTERIOR MAXILLARY OVERJET

The results of the present study indicated that 24.1% of the study population had anterior maxillary overjet > 3 mm, which is in agreement with other studies.^{14,19,20,23} Tak et al¹⁶ and Damle et al¹⁸ reported a lower prevalence (16.7 and 12.7% respectively).

ANTERIOR MANDIBULAR OVERJET

About 0.9% of the study subjects reported anterior mandibular overjet with ≥ 1 mm. The results in this study were in correlation with that of Tak et al¹⁶ and Damle et al.¹⁸ Higher prevalence was reported by related studies.^{19,20,22,23} On the contrary, Shivakumar et al¹⁵ reported lower prevalence of 0.3%. This difference observed could be attributed to variation in growth and disproportion in the dentoalveolar width and genetic predisposition.

VERTICAL ANTERIOR OPEN BITE

About 1.2% study subjects presented with ≥ 1 mm of vertical anterior open bite. The results of the study were

comparable with that of Damle et al.¹⁸ and Mallick et al.²² On the contrary, a higher prevalence was observed by Baca-Garcia et al.,²³ Shivakumar et al.,¹⁵ Tak et al.,¹⁶ Al-Zubair,¹⁹ and Nayak et al.²⁰

This disagreement in results could be due to variation in development and maturation of the arches, and the children might have had different deleterious oral habits like mouth breathing and tongue thrusting.

ANTEROPosterIOR MOLAR RELATIONSHIP

In the current study, 86.7% had a half or full cusp deviation from the normal relation. This finding is higher when compared with that of other studies.^{15,16,19,20,22,23} The racial and genetic differences in the various populations may have an effect on the prevalence of deviated anteroposterior molar relation.

DAI SCORE DISTRIBUTION

The results of the present study indicated that 67.6% had DAI scores ≤ 25 with no abnormality or minor malocclusion requiring no or slight orthodontic treatment need, 19.3% had DAI scores of 26–30 with definite malocclusion requiring elective treatment, 8.5% had DAI scores of 31–35 with severe malocclusion requiring highly desirable treatment, and 4.7% had DAI scores ≥ 36 with very severe malocclusion or handicapping malocclusion requiring mandatory treatment. The results of present study were in agreement with the studies by Tak et al.,¹⁶ Nayak et al.,²⁰ Mallick et al.,²² and Shenoy et al.²⁴ In contrast, some of the studies reported lower treatment needs.^{15,18,25,26} Baca-Garcia et al.,²³ Marques et al.,¹⁴ and Al-Zubair¹⁹ reported higher treatment needs.

In the present study, the 14-year-old children had disabling malocclusion than 13-year-old children, whereas majority of the children who required no treatment were 15-year-olds, and the difference among them was statistically significant. The results are in agreement with that of Tak et al.¹⁶ The results were in contrast to the study conducted by Anita et al.¹⁷ and Babu and Gopu,²⁷ which showed higher treatment needs for 15-year-old children.

In the present study, male population had higher proportion of malocclusion requiring treatment as compared with females. This finding is close to that reported for children in many similar studies.^{15,16,18,25,26} In contrast, female population requiring more treatment were found in studies by Shenoy et al.,²⁴ Al-Zubair,¹⁹ and Mallick et al.²² Overall prevalence of malocclusion in the present study was 32.5%. It includes definite, severe, and very severe types of malocclusion. It excludes the minor malocclusion which was reported jointly with no malocclusion because many orthodontists would not recommend treatment for such cases. This finding is in comparison

with other studies.^{16,22,24,26} The present study population portrayed a greater prevalence when compared with those of Shivakumar et al.,¹⁵ Babu and Gopu,²⁷ and Damle et al.¹⁸ Higher prevalence of malocclusion was observed by Al Zubair,¹⁹ Marques et al.,¹⁴ and Baca-Garcia et al.²³ Such discordance in results may be related to racial, age, and cultural differences between the population studies, differing sample sizes, and also to the range of study designs and statistical methodologies employed. Jenny et al.²⁸ suggested that inherited differences in tooth size and arch size could be one reason for differences in DAI scores as the DAI includes measurements of the most relevant orthodontic traits that affect dental esthetics. In the present study, males had slightly higher mean DAI scores (24.51 ± 5.502) than females (24.13 ± 5.742). Similar findings were reported by Tak et al.¹⁶ Studies by Anita et al.¹⁷ reported higher DAI scores among females rather than males. This difference in the mean DAI scores may be due to the variations in growth, facial skeleton development, occlusion, and genetic predisposition. In the current study, higher mean DAI scores (24.81 ± 6.027) were observed in 14-year-old schoolchildren. Almost same findings were reported by Anita et al.¹⁷ However, Shivakumar et al.¹⁵ and Tak et al.¹⁶ reported higher mean DAI scores in 13-year-old schoolchildren. A plausible explanation to this disagreement could be that certain DAI components, such as overjet, spacing, and molar relationships that naturally improve with age appeared not to have been taken into account. The DAI does not consider developmental changes but measures only orthodontic symptoms that are self-correcting.

In interpreting the outcome of this study, it is important to bear in mind the limitations of the present study. The cross-sectional nature of the present study limits the determination of a true age difference in the malocclusion traits and DAI scores. Differences in age groups or cohort can be described, but the differences cannot be definitively explained. This necessitates a longitudinal study. The DAI does not represent all occlusal traits. The DAI may underestimate the occurrence of malocclusion for failing to address conditions, such as posterior cross-bite, deep bite, or midline displacement, which are major occlusal problems that could strongly influence the treatment need. The DAI does not consider developmental changes that coincide with chronologic age, and it should be tested further in a longitudinal study.

CONCLUSION

The prevalence of malocclusion and orthodontic treatment needs among schoolchildren of Bengaluru North 4, Karnataka, India, was found to be 32.5%; 14-year-old male students presented more prevalence of definite malocclusion and need for orthodontic treatment. Males

had slightly higher mean DAI scores (24.51 ± 5.502) than females (24.13 ± 5.742). Malocclusion as assessed by using DAI was characterized by a relatively high frequency of half or full cusp deviation from normal molar relation followed by incisal crowding and largest anterior mandibular irregularity.

The present study provides the baseline data essential for planning school-based orthodontic preventive programs targeted at both parents and children to enable them benefit from preventive and interceptive orthodontic care. This can be implemented by inception of knowledge about preventive orthodontic practice in the school syllabus. There is also a pressing need to inculcate the orthodontic services in the current public health policies to fill the lacunae. A sustained public-private partnership can be one of the stepping stones in this direction.

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