

# PREVALENCE OF MALOCCLUSION AND ORTHODONTIC TREATMENT NEED AMONG 12-15 YEARS OLD SCHOOL CHILDREN IN DAVANGERE, KARNATAKA, INDIA

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## ABSTRACT

*The study was done to assess the prevalence of malocclusion and orthodontic treatment needs using Dental Aesthetic Index (DAI) among 12-15 years old school children in Davangere, Karnataka – India. A total of 2010 high school students (991 males and 1019 females) randomly selected from public and private schools were examined for malocclusion using Dental Aesthetic Index by single examiner. The results showed that the mean Dental Aesthetic Index score of 18.2, with males having a significantly higher DAI score (18.9) than females (17.5). It was observed that 83.4% of the study population had DAI score  $\leq 25$  which required no or slight treatment. 15.5% required elective treatment and only 1.1% of the children with DAI score of 31-35 required emergency treatment. A highly statistical significant difference in DAI scores was found between males and females ( $P < 0.001$ ).*

**Key words:** Dental Aesthetic Index (DAI) malocclusion, school children, orthodontic need.

## INTRODUCTION

The interest and awareness in dental health has increased considerably over the last few years, likewise the increasing demand for orthodontic care globally urges the need to develop various methods to assess and grade malocclusion in order to prioritize treatment. Though a large number of studies on the prevalence of malocclusion in different populations have been published<sup>1-10</sup>, its prevalence has been the debate for many years.<sup>11</sup> Fundamentally, the difficulties seen are due to the fact that malocclusion is not a disease but a morphological variation which may or may not be associated with pathological conditions. Hence, it has been so difficult to obtain the desired international standardization for registration of malocclusion.

There are many orthodontic indices that combine physical and visual elements to provide a measure to the degree of malocclusion; nevertheless the Dental

Aesthetic Index (DAI) has been adopted by the World Health Organization as an international cross-cultural index.<sup>12-14</sup> Dental Aesthetic Index links clinical and aesthetic components mathematically to produce a single score. It is simple as well as economical in terms of time.<sup>15</sup>

Therefore, the present study was designed to determine the prevalence of malocclusion and orthodontic treatment needs among 12 to 15 years old school going children using Dental Aesthetic Index in India.

## METHODOLOGY

A sample size of 2010 was estimated based on the results of pilot study. Using stratified random sampling technique, twenty high schools consisting of both public and private schools were selected for the study, from Davangere city, Karnataka. Ethical clearance from Institutional Review Board and permission from concerned school authorities was obtained. The subjects from the selected schools were included only, if their

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chronological age was 12-15 years. Those undergoing orthodontic treatment or had completed orthodontic treatment were excluded from the study.

The examiner (public health dentist) and recording assistant was trained and calibrated prior to the commencement of the study to ensure reliability. A validation exercise was conducted during the study. Sub-samples of 10% were re-examined to check intra-examiner variability, which was found to be satisfactory (kappa value = 0.8). The examination for malocclusion was made according to DAI using Community Periodontal Index Probe and plane mouth mirror as described by World Health Organization<sup>14</sup> under adequate natural day light in school premises and DAI scores were assessed for orthodontic treatment needs as described in Table 1.

Data were analyzed using the statistical packages SPSS (version 11) and Minitab software, (version 3.1). Statistical analysis for comparison of malocclusion prevalence between different population groups was done by Chi-Square test and Z test. Significance for all statistical tests was predetermined at a probability value of 0.05 or less.

## RESULTS

A cross-sectional study was conducted among 2010 Davangere, Karnataka, Indian school going children aged 12 to 15 years to determine the prevalence of

malocclusion and orthodontic treatment needs using DAI.

Table 2 shows the distribution of study population according to age and sex. A total of 2010 school children formed the study population, out of which 991 (49.3%) were males and 1019 (50.7%) were females. 517 (25.7%) were 12 years (271 males, 246 females), 464 (23%) were 13 years old (218 males, 246 females), 546 (27.1%) were 14 years old (281 males, 265 females) and 483 (24.2%) were 15 years old children (221 males, 262 females).

Crowding was the most common type of malocclusion presented by the study group (37.4%) with around 20% of the population demonstrating one segment crowding. Age-wise it was observed that crowding of anterior teeth (40.1%), incisal segments spacing (10.6%) and anterior-posterior molar deviation (15.9%) was most prevalent among 14 years as compared to other ages (Table 3). Features like cross bite and open bite were the least recorded seen only in 0.4% and 1% of the population respectively.

Sex-wise distribution also showed crowding to be the most common malocclusion trait with a significant difference among males and females ( $p < 0.001$ ). Likewise, anterior-posterior molar deviation was significantly more common in males ( $p < 0.001$ ) with majority having half cusp deviation. Although diastema was more common in females (8.5%), this difference was not statistically significant (Table 3).

TABLE 1: ORTHODONTIC TREATMENT NEED BASED ON DAI SCORES

Severity of Malocclusion	Treatment indication	DAI Score
No abnormality or minor malocclusion	No or slight need	≤5
Definite malocclusion	Elective	26-30
Severe malocclusion	Highly desirable	31-35
Very severe or handicapping	Mandatory	≥36

TABLE 2: DISTRIBUTION OF STUDY POPULATION ACCORDING TO AGE AND SEX

Age Group	No. of subjects n (%)		
	Males	Females	Total
12 years	271 (52.4)	246 (47.6)	517 (25.7)
13 years	218 (47)	246 (53)	464 (23)
14 years	281 (51.5)	265 (48.5)	546 (27.1)
15 years	221 (45.8)	262 (54.2)	483 (24.2)
Total	991 (49.3)	1010 (50.7)	2010 (100)

TABLE 3: DISTRIBUTION OF MALOCCLUSION FEATURES ACCORDING TO AGE AND SEX

Malocclusion Feature	Age n (%)				p value	Sex n (%)		p value
	12 yrs	13 yrs	14 yrs	15 yrs		Males	Females	
Crowding of anterior teeth	347(67.1)	264(56.9)	327(59.9)	320(56.3)	< 0.001 *	556(56.1)	702(68.9)	< 0.001 *
One segment	104(20.1)	108(23.3)	96(17.6)	96(19.9)		205(20.7)	199(19.5)	
Two segment	66(12.8)	92(19.8)	123(22.5)	67(13.9)		230(23.2)	118(11.6)	
Incisal Spacing	467(90.3)	433(93.3)	488(89.4)	438(90.7)	0.15	896(90.4)	930(91.3)	0.64
One segment	33(6.4)	23(5)	48(8.8)	33(6.8)		69(7)	68(6.7)	
Two segment	17(3.3)	8(1.7)	10(1.8)	12(2.5)		26(2.6)	21(2.0)	
Midline diastema	481(93)	418(90)	502(91.9)	447(92.5)	0.31	917(92.5)	931(91.4)	0.19
1 mm	30(5.8)	30(6.5)	30(5.5)	29(6)		54(5.4)	65(6.4)	
2mm	6(1.2)	15(3.2)	14(2.6)	7(1.5)		20(2.1)	22(2.1)	
3mm	0(0)	1(0.30)	0(0)	0(0)		0(0)	1(0.1)	
Anterior Posterior	495(95.7)	391(84.3)	459(84.1)	452(89.4)	<0.001 *	835(84.1)	962(94.4)	0.001 *
Half cusp deviation	20(3.9)	70(15.1)	84(15.4)	29(6.1)		152(15.5)	51(5)	
Full cusp deviation	2(0.4)	3(0.6)	3(0.5)	2(0.5)		4(0.4)	6(0.6)	
Anterior Missing Teeth	503(97.3)	446(96.1)	526(96.3)	466(96.5)	0.21	956(96.5)	985(96.7)	0.43
One tooth	14(2.7)	14(3)	19(3.5)	17(3.5)		34(3.4)	30(2.9)	
Two teeth	0(0)	4(0.9)	1(0.2)	0(0)		1(0.1)	4(0.4)	
Mean DAI Scores	17.5	18.9	18.8	17.7,	< 0.001 *	18.9	17.5	<0.001 *

\* Highly significant

When the need for orthodontic treatment was assessed based on DAI scores, it was seen that majority of the population (83.7%) had a score  $\leq 25$  indicating no treatment required as compared to only 1.1% of the population having a mean DAI score between 31-35 requiring highly desirable treatment. The overall mean DAI score for males was  $18.9 \pm 5.1$  which was significantly higher as compared to females ( $17.5 \pm 4.1$ ) (Table 3)

## DISCUSSION

The present study was designed to provide information about the prevalence of malocclusion and orthodontic treatment needs among 12-15 years old school going children. Although assessment of malocclusion in non-growing population is more reliable, this range (12-15 yrs) was chosen because it represents the majority of school children with developing malocclusion who require orthodontic treatment. In the present study, only 1.17 % of the study population had a DAI score of 31-35 indicating severe malocclusion and treatment highly desirable. A similar study in American population<sup>16</sup> reported 16% with this degree of orthodontic need. This difference could be because the later was a retrospective study done in study models. 83.4% of the study population had the mean DAI score of  $\leq 25$  which required slight or no orthodontic treatment. On the contrary studies done on Japanese population<sup>17</sup>, Iranian<sup>18</sup> and American population<sup>16</sup> had higher DAI scores of 30.5, 23.5 and 36.9 respectively. Large difference in the mean DAI scores of the above mentioned studies as compared to the present study may be due to racial variation, different sample size, genetic predisposition, differences in lifestyle and variations in growth and facial skeleton.

In the present study males had significantly higher mean DAI scores (18.9) as compared to females (17.5). Similar results were obtained in the studies done by Rashidha et al<sup>19</sup> on Malaysian children and Danaei et al<sup>18</sup> on Iranian children. However, this contrasts the findings of Olayinka et al<sup>20</sup>, Onyeaso et al and Sanu<sup>21,22</sup>, wherein no significant gender difference in mean DAI scores was observed. This difference could be due to variation in the dento- facial morphology for boys and girls in this part of the world.

Among the other malocclusion traits, crowding of either one anterior segment or two segments was the

most common noted feature. In this study males had more crowding (43.9%) than females (31.1%) which agree with findings of the studies done by Takahashi et al<sup>23</sup>, Johnson et al<sup>24</sup> on Japanese and New Zealand population, respectively. Likewise, in this study, spacing was more among males (9.6%) than females (8.7%), whereas midline diastema was slightly higher among females (8.5%), which could be a feature of Indian population. These results are similar to the study done by Al-Emrans et al<sup>25</sup> on Saudi Arabian population. The reasons for crowding and spacing may be due to arch length and tooth material discrepancy and X-linkage in relation to tooth size as been previously documented.<sup>26</sup> In the present study 1% of study population had anterior open bite between 1-4mm. Similar results were obtained by Hill et al.<sup>11</sup>

## CONCLUSION

The present study ascertains the prevalence of malocclusion among 12-15 years old school going children of Davangere city, Karnataka. Dental Aesthetic Index was used to record malocclusion. Around 20% and 17.3% of the children had one segment and two segments crowding, respectively. Only 2.4% of the children had two segment spacing as compared to 6.8% who had one segment spacing. Majority (80.1 %) had over jet of 1 mm and 10.6% of the study population had either half/full cusp deviation in the AP molar relation. Therefore, overall the present study reflects that Davangere Indian students show better dental appearance and less orthodontic treatment need.

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