PREVALENCE OF MALOCCLUSION AND TREATMENT NEEDS OF 12 YEAR OLD SCHOOL CHILDREN, CHENNAI USING THE DENTAL AESTHETIC INDEX (DAI)

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Study was conducted to assess the prevalence of malocclusion and treatment needs among 12-year old school children in chennai using Dental Aesthetic Index (DAI). A cross sectional study done on school children aged 12 years attending different higher secondary schools in chennai, India. Four schools were selected randomly and all 12 year old children were included in the study. A total of 613 school children (334 boys and 279 girls) were examined. Clinical examination was carried using Dental Aesthetic Index (DAI). Chi-square test was done to test the association between malocclusion and gender. 56.3% had a dental appearance which required no orthodontic treatment, 25.1% had a definite malocclusion, where treatment was 'elective' and 12.1% had severe malocclusion and 6.2% had handicapping malocclusion, where treatment was considered to be highly desirable and mandatory. The difference in malocclusion severity level among boys and girls was not statistically significant (p=0.684). The prevalence of definite and severe malocclusions was higher in the 12 years old school going children when compared to handicapping conditions in the present study. The need to implement preventive and interceptive orthodontic care is of utmost importance thereby improving the aesthetic perception and social function.

Key words: Malocclusion, school children, prevalence, Dental Aesthetic Index (DAI)

Crowding, irregular and protruding teeth have been a problem for some individual's since antiquity and attempts to correct this disorder go back at least to 1000 BC[1]. Malocclusion may be understood as the mal-relationship of dental unit with respect one another, both inter-arch and intra-arch and to the other components of the cranio-facial complex. It can also be said to be a deviation existing in an individuals from the standard concept of occlusion.

Orthodontic treatment involves the correction of malocclusion with the aim of enhancing dental health and function. Malocclusion is largely determined by genetic factors and dental appearance has been suggested to be the main motivating factor for orthodontic treatment. According to Salzman, "The epidemiologic determination of a disease is the first step in public health endeavors".[2] Collecting epidemiological data concerning the dental health and morbidity among communities is of primary importance, as it has been recommended and stressed by the World Health Organization (WHO)[3].

The prevalence of malocclusion and treatment needs in studies conducted in Spain[4], Malaysia[5] and Nigeria[6] was 41%, 37% & 13% respectively. A number of studies have been conducted to estimate the prevalence of malocclusion in India. The prevalence of malocclusion was 49.2% in Trivandrum[7], 51.5% in Bangalore[8], 28.8% in Udipi[9], 14.1% in Mandu[10], 15.7% in Delhi[11], and 19.9% in Chennai[12]. In 2005, a study conducted in Chennai on the oral health status of 12 year old children, revealed malocclusion of mild to moderate degree[13]. It is quite difficult to estimate the proportion that requires orthodontic treatment. This is due to the multiplicity of measurement methods and the difficulty in standardizing the criteria. The lack of suitable universal methods for recording and grading malocclusion and the different criteria used to define malocclusion have made comparison between the studies difficult[3].

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The WHO, in order to address this problem, has published, in its latest edition of basic methods for oral health surveys, a description of the Dental Aesthetic Index (DAI) which outlines criteria for the assessment of dentofacial anomalies. The DAI is an orthodontic index that links clinical and aesthetic components mathematically to produce a single score. It also aims to predict the clinical judgments of orthodontists by separating handicapping and non-handicapping malocclusions[4]. The DAI has been studied in several different populations over recent years but it was sparingly used to estimate the prevalence of malocclusion in India, especially in Chennai, Tamil Nadu. Many factors influence the perceived orthodontic treatment need of the people such as discrimination, media, peers and parents influence, social status, ethnicity and demographic areas, self esteem, better occupation, dental and facial appearances, functions (mastication, tempromandibular joint disorders, speech), gender, age, availability of the service and payment methods. These factors can also be grouped into perceptions of need for orthodontic treatment, aesthetic perception, function and social functioning.

Table 1: The components of the standard DAI regression equation and their actual and rounded regression coefficients (weights)

DAI component		Regression coefficient	
Weight		Actual weight	rounded
1)	Number of missing visible teeth(incisors, canines and Premolars in the maxillary and mandibular arches)	5.76	6
2)	Crowding in the incisal segments: 0=No segment crowded 1=1 segment crowded, 2=2 segment crowded	1.15	1
3)	Spacing in incisal segments: 0– no spaced, 1=1 segment spaced, 2=2 segment spaced	1.31	1
4)	Midline diastema in mm	3.13	3
5)	Largest anterior irregularity on the maxilla in mm	1.34	1
6)	Largest anterior irregularity on the mandible in mm	0.75	1
7)	Anterior maxillary overjet in mm	1.62	2
8)	Anterior mandibular overjet in mm	3.68	4
9)	Vertical anterior open bite in mm	3.69	4
10)	Antero-posterior molar relation: largest deviation from Normal either left or right: 0= normal, 1= half cusp either Mesial or distal, 2= one full cusp or more either mesial or distal	2.69	3
11)	CONSTANT	13.36	13
	Total	DAI score	

The present study is designed to assess the prevalence of malocclusion and treatment needs among 12-year old school children in Chennai using dental aesthetic index (DAI) and perceptions of need for orthodontic treatment, aesthetic perception and social functioning.

MATERIALS AND METHODS

A descriptive study was carried out on 12 year old children of Chennai for the assessment of malocclusion and treatment needs. The study population consisted of 36,579 (boys=17,935; girls=18,644)[16] school children attending 232 secondary and 426 higher secondary schools. All the children who had completed 12 years of age and who were present on the day of examination were included in the study. The sample size was estimated to be 576 subjects based on Rashidah Esa et al (2001)5 study. Four schools were randomly selected from the list of schools and all the 12-year old children from the selected schools were included in the study. Approval from the concerned school authorities, institutional review board and informed consent from the parents or guardian of school children were obtained prior to the study. Students who had received or undergoing orthodontic treatment, medically compromised children, handicapped children and subjects not willing to participate were excluded.

A total of 613 school children (334 boys and 279 girls) were examined. All the children from the last selected school were included and hence the total became 613. All the study subjects were examined by a single examiner with the use of mouth mirror and CPI probe. The intra-examiner reliability was assessed and kappa statistics was applied (k=0.71). The clinical examination criteria employed was the Dental Aesthetics Index (DAI), which is rank-ordered on a continuous scale to assess severity levels in order to prioritize treatment need[17] (Table 1). Each subject is examined and scored for the ten components of the DAI (Table 2). Each component is multiplied by its corresponding regression coefficient using the rounded weights. The products is added, and summed with the regression constant to give the total DAI score. Each subject's DAI score is then placed along the dental aesthetic continuum to determine their percentile score.

Information's such as name, age, gender, perception of need for orthodontic treatment, social function and their self satisfaction with their appearance were obtained.

RESULTS

Fig 1 show the distribution of study subjects. Six hundred thirteen (613) 12 year old school children were examined, of which 334(54.5%) were boys and 279(45.5%) were girls.

Table 3 describes the proportion of subjects within malocclusion severity levels. Of the 613 subjects, 38(6.2%) had handicapping malocclusion, whose treatment need was mandatory, 76(12.4%) had severe malocclusion, whose treatment need was

Table 2: Malocclusion Severity levels.

DAI SCORE	SEVERITY LEVELS
13-25	Minor or no anomaly: no treatment need
26-30	Definite malocclusion: treatment elective
31-35	Severe malocclusion: treatment highly desirable
36-70	Handicapping malocclusion: treatment mandatory

The data collected was analysed and tested for significance using statistical software packages, SPSS software for windows (version 15.0). Frequency tables were computed. 'Chi-square test' was used to test the association between malocclusion and gender.

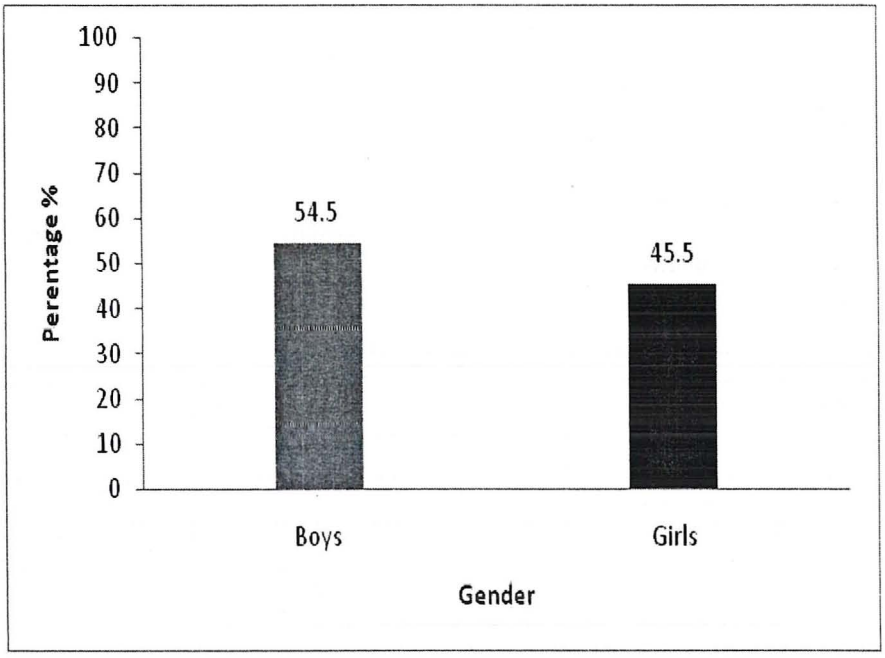


Fig 1: Distribution of study subjects

Table 3: Proportion of subjects within malocclusion severity levels

DAI Score	Malocclusion Severity levels	Gender				Total	
		Boys*		Girls*			
		n	%	n	%	N	%
13-25	Minor or no anomaly: no treatment need	183	29.8	162	26.4	345	56.3
26-30	Definite malocclusion: treatment elective	85	13.9	69	11.3	154	25.1
31-35	Severe malocclusion: treatment highly desirable	46	7.5	30	4.9	76	12.4
36-70	Handicapping malocclusion: treatment mandatory	20	3.3	18	2.9	38	6.2
Total		334	54.5	279	45.5	613	100.0

* $\chi^2 = 1.492$, d.f=3, p=0.684

highly desirable, 154(25.1%) had definite malocclusion whose treatment need was elective, 345(56.3%) had minor or no anomaly, who need not require any treatment. The difference in malocclusion severity level among boys and girls was not statistically significant (P=0.684).

Table 4 illustrates the distribution of DAI components according to gender. Crowding (76.2%), upper anterior irregularity (36.1%), upper overjet (35.2%), lower anterior irregularity (34.4%), spacing (26.6%), molar relation-one half cusp (21.2%) Diastema (14.2%), molar relation one full cusp (5.5%) lower overjet (5.2%), openbite (1.6%) and missing tooth (0.5%) were found in descending order.

Table 5 describes the perception of need for orthodontic treatment among study subjects. 297(48.5%) children had expressed that they need orthodontic treatment and 316(51.5%) children had expressed that they do not require orthodontic treatment.

Table 4: Distribution of DAI components according to gender

DAI Component		Boys		Girls		Total	
		n	%	n	%	n	%
Missing teeth	0	331	54.0	279	45.5	610	99.5
Crowding	1-5	3	0.5	0	0	3	0.5
	0	98	16	48	7.8	146	23.8
Spacing	1-2	236	38.5	231	37.7	467	76.2
	0	234	38.2	216	35.3	450	73.4
	1-2	100	16.3	63	10.3	163	26.6
Diastema(mm)	0	274	44.7	252	41.1	526	85.8
	>1	60	9.8	27	4.4	87	14.2
Upper anterior irregularity	0-1	205	33.4	187	30.5	392	63.9
	>1	129	21.0	92	15.0	221	36.1
Lower anterior irregularity	0-1	214	34.9	188	30.7	402	65.6
	>1	120	19.6	91	14.8	211	34.4
Upper overjet	0-3	218	35.6	179	29.2	397	64.8
	>4	116	18.9	100	16.3	216	35.2
Lower overjet	0	317	51.7	264	43.1	581	94.8
	>0	17	2.8	15	2.4	32	5.2
Openbite	0	327	53.3	276	45.0	603	98.4
	>0	7	1.1	3	0.5	10	1.6
Molar relation	Normal	242	39.5	207	33.8	449	73.2
	One-half-cusp	78	12.7	52	8.5	130	21.2
	One full cusp	14	2.3	20	3.3	34	5.5

Table 5: Perception of need for orthodontic treatment among the study subjects

Perception of need for orthodontic treatment	Yes		No	
Do you think your teeth need straightening?	Boys (%)	Girls (%)	Boys (%)	Girls (%)
	186(30.3)	111(18.1)	148(24.1)	168(27.4)
Total (N= 613)	297 (48.5)		316 (51.5)	

Table 6: Aesthetic perception among the study subjects

Aesthetic perception	Good		Fair		Poor	
How much do you like	Boys (%)	Girls (%)	Boys (%)	Girls (%)	Boys (%)	Girls (%)
the way your teeth look?	27(20.7)	159(25.9)	143(23.3)	72(11.7)	61(10.1)	48(7.8)
Total (**N= 613**)	286(46.6)		215(35.1)		112(18.3)	

Table 6 describes the aesthetic perception among the study subjects. 286(46.6%) children said that they have good occlusion, 215(35.1%) and 112(18.3%) children said that they have fair and poor occlusions respectively.

Table 7 describes the social function of study subjects. 104(17.0%) children were worrying about laughing frequently and 76(12.4%) children expressed that other students make jokes about the way their teeth look frequently.

DISCUSSION

In the present study, Dental Aesthetic Index was adopted as an epidemiological tool because it combines the physical and aesthetic aspects of occlusion mathematically to produce a single score. Since the standard DAI is based on perception of dental aesthetics in the USA, it has the advantage of being applied universally without the need for modifications or adaptations to different ethnic or cultural settings.

This study was done on 12 year old school children of Chennai. Six hundred and thirteen children were examined, of which 334 were boys and 279 were girls.

The results of this study indicate that 56.3% of the 12 year old school children examined were found to have a dental appearance that required no orthodontic treatment. This is low as compared to other studies conducted among 12-13 year old Malaysian school children (62.6%) (Rashidah Esa et al 2001)5 and 12-18 year old Nigerian secondary school children (77.4%) (Olayinka D, Otuyemi et al 1999)6. There appears to be a considerable proportion of the populations (6.2 per cent) with handicapping malocclusion, where treatment is considered mandatory. 37.5 % of the study population was with severe to definite malocclusion, where treatment is highly desirable to elective, based on the decision points along the DAI scale.

In this report, crowding, spacing, and diastema was found to be 76.2%, 26.6% and 14.2% respectively. The findings were higher when compared to previous study conducted in Chennai (Mahesh Kumar P et al 2005)13.

On comparing the mean DAI score with other population, it was found that Native Americans18, Japanese14 and Australians19 showed higher mean scores. Large differences between the mean DAI scores of Chennai school children and those of Native

Table 7: Social function among the study subjects

Social function	Frequently						Less frequently						Never					
	Boys		Girls		Total		Boys		Girls		Total		Boys		Girls		Total	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Worried about laughing or smiling because of the way their teeth look	71	11.6	30	4.9	104	17	114	18.6	54	8.8	165	26.9	149	24.3	195	31.8	344	56.1
Students make jokes about the way their teeth look	55	9	21	3.4	75	12.4	80	13.1	30	4.9	110	18	199	32.5	228	37.2	427	69.7

Americans18, Japanese14 and Australians19 may be due to racial variation (*Table 8*). Also differences may be due to different sample sizes and/or ages ranges.

Nevertheless, the DAI is not exempt from drawbacks: it fails to detect certain occlusal disorders that may have major aesthetic impact, such as deep bites or posterior cross-bites, and it takes no account of the shape, size or colour of teeth and gums.

CONCLUSION

The prevalence of malocclusion in the present study was 43.7%. At present, orthodontic care is by and large provided on the basis of payment by the trained orthodontists, which makes it rather expensive and unaffordable. The need to implement preventive and interceptive orthodontic care is of utmost importance thereby improving the aesthetic perception and social function.

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Table 8: Mean Dental Aesthetic Index (DAI) score for chennai school children and other population

Population(reference)	Sample size	Age range	Mean DAI score
Caucasian americans[18]	1337	7-12	26.5
Native americans[18]	485	7-12	31.8
Caucasian(s.australia)[19]	5000	13	28.1
Japanese[14]	409	15-18	30.5
Caucasian Australians[19]	268	12-16	24.1
Polcs(lodz)[20]	1000	12-13	24.5
Malaysian[5]	1512	12-13	24.6
Chinese(taiwan)[21]	176	18-24	22.3
Spanish[4]	744	14-20	25.6
Nigerian[6]	703	12-18	22.3
Iranians[15]	900	12-15	23.5
Indians(chennai) present study	613	12	25.56

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Conclusion

This case report demonstrates that with the stringent case selection criteria, aseptic endodontic procedure along with periodontal regenerative procedure along with bone graft material could successfully treat an endodontic –periodontal combined lesion. In this case no histological examination was performed, it is difficult to conclude unequivocally that true regeneration occurred or if repair was the result. However from clinical and radiographic findings ,the result of this combined technique was quite impressive.

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