Orthodontic Treatment Need in Bangladeshi Young Adults Evaluated Through Dental Aesthetic Index

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ABSTRACT

Aim : The objectives of this study were to evaluate the severity of malocclusion and orthodontic treatment need in Bangladeshi young adults by using the Dental Aesthetic Index (DAI).

Methods: This cross-sectional study was conducted at Government and private college of Dhaka and Netrokona, Bangladesh. A total of 405 students (from 17 to 25 years old) were selected by convenience sampling. Students wearing orthodontic appliance or reporting a history of orthodontic treatment were excluded from the study. Clinical examinations were conducted using the Dental Aesthetic Index (DAI). The chi-square test (x2) was used to compare malocclusion severity. The analysis of variance (ANOVA) test was used to compare the changes in DAI scores and the mean DAI scores between various age groups. The t test was used to compare the mean DAI scores between sex groups.

Results: 405 college students were examined, 305(75.3%) were boys and 100(24.7%) were girls. Most of the students 277(68.4%) had DAI scores $\leq$ 25 with no or little malocclusion requiring slight or no orthodontic treatment, 76(18.8%) had DAI score of 26-30 with definite malocclusion requiring elective orthodontic treatment, 34(8.4%) had DAI score of 31-35 with severe type of malocclusion requiring highly desirable orthodontic treatment, 18(4.4%) had DAI score $\geq$ 36 with very severe or handicapping malocclusion requiring mandatory orthodontic treatment.

Conclusion: The majority of the students in our study (68.4%) required no or little treatment; (12.8%) had definite malocclusion requiring definite orthodontic treatment.

Key words: **Malocclusion; Orthodontic treatment need; Dental Aesthetic Index; Young adults; Bangladesh** (Bangladesh Journal of Orthodontics and Dentofacial Orthopedics, April 2013; Vol-3, No. 2, p 1-8)

INTRODUCTION

Increased concern over dental appearance has been observed during childhood and adolescence to early adulthood. The public equates a good dental appearance with success in many pursuits.[1] The decision to start orthodontic treatment is primarily influenced by the desire to look attractive, self perception of dental appearance and psychosocial well being. Genetic, environmental or a combination of both factors along with various local factors such as adverse oral habits and anomalies in number, form and developmental position can cause malocclusion.[2] Malocclusion has been shown to affect periodontal health, increase the prevalence of dental caries and cause temporo-mandibular joint problems.[3] Hence it is important to determine the prevalence of malocclusion and its occurrence and distribution in a community.

Over the years, a variety of indices have been developed to assist professionals in categorizing malocclusion according to the level of treatment need.[4] Cons et al. of the United States of America developed the Dental Aesthetic Index that combined the psychosocial and physical elements of malocclusion,[5] and integrated into the international collaboration Study of Oral Health Outcomes by the World Health Organization (WHO, 1989) as an international index,[6,7] identifies occlusal traits and mathematically derives a single score. The components of the DAI regression equation and their actual and rounded regression coefficient (weights) are shown in (table 1). The Standard DAI regression equation calls for the measured components of the DAI to be multiplied by their rounded regression coefficients (weights); the addition of their products and the addition of a constant number to the total. The resulting sum is the DAI score. The Standard DAI loses relatively little precision when regression weights are rounded. After an individual score has been calculated it can be placed on a scale to determine the point at which the score falls between most and least aesthetic dental appearance.[5]

The prevalence of malocclusion varies from country to country and between different age and sex groups. To assess the severity and Orthodontic treatment need in Bangladeshi young adults, we need a widely accepted tool. DAI is such an index that is widely accepted, more valid and reliable. DAI

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has been adopted by the World Health Organization (WHO) as a cross cultural index[6] and has been applied among diverse ethnic groups without modification.[8,9] all these reasons made it suitable epidemiological index for using in developing countries.[9]

Table1: shows the individual rounded weight of DAI component with its constant number.

DAI Components	Rounded Weight
1. Number of missing visible teeth (incisor, canine and in the maxillary and Mandibular arches)	6
2. Assessment of crowding in incisal segment: 0=no segment crowed; 1=1segment crowded; 2=2segment crowded.	1
3. Assessment of spacing in incisal segment: 0=no segment spaced; 1=1 segment spaced; 2= 2 segment spaced.	1
4. Measurement of an midline diastema in mm	3
5. Largest anterior irregularity on the maxilla in mm.	1
6. Largest anterior irregularity on the mandible in mm.	1
7. Measurement of anterior maxillary overjet in mm	2
8. Measurement of anterior mandibular overjet in mm	4
9. Measurement of vertical anterior open bite in mm	4
10. Assessment of antero-posterior molar relation; largest deviation from normal either left or right, 0=normal, 1=1/2cusp either mesial or distal; 2=one full cusp either mesial or distal	3
11. Constant	13

The area of Bangladesh is about one lac forty-seven thousand(1,47,000) square kilometer where more than one forty million people live in that is one of the most densely populated country in the world. The country has the highest proportion of young people; therefore a study of malocclusion is important from the point of dental health of a population. Epidemiological assessment of malocclusion and its associated treatment need have received little attention in developing country like Bangladesh. Nevertheless malocclusion undoubtedly a public health concern in any country.[10,11]

In this cross sectional study, the DAI was used to assess the frequency and severity of malocclusion and the associated orthodontic treatment need in Bangladeshi young adults and their distribution according to age and sex.

MATERIALS AND METHODS

A total of 405 convenience sample was obtained from the students (17-25yrs) of Dhaka Dental College Dhaka, the capital city and Netrokona Government College, Abu Abbas Degree College, N. Akand Kamil Madrasa of Netrokona district, Bangladesh. Approval to conduct this study was received from the Ethical Clearance Committee of Dhaka Dental College ethical board and all participants signed a consent letter. Students were excluded from the study if they wore an orthodontic appliance or reported a history of previous orthodontic treatment, non co-operative or suffered from any systemic illness.

A clinical examination was carried out at the clinical room of Orthodontics and Dentofacial Orthopedics Department of Dhaka Dental College and a room facilities with sufficient natural light were provided by the respective college authority of Netrakona district by one calibrated examiner according to the method recommended by WHO.[6] The DAI consists of 10 (ten) occlusal traits related to Dentofacial anomalies according to the three components of dentition, spacing-crowding and occlusion. Scores for each component were multiplied by a previously reported weight, and a constant was added to obtain a final DAI score for each student. The calibration process was conducted before the study guarantee reliable data collection.100 students were re-examined out of 405, by the same examiner to calculate the intraexaminer reliability. The attained reliability (0.87, intraclass correlation coefficient) was in agreement with the recommended standards.

DAI scores were not normally distributed as it was determined by the Shapiro-Wilks test (p<.015). The chi-square test(x2) was used to compare malocclusion prevalence between different groups. The analysis of variance (ANOVA) test was used to compare the changes in a DAI score and the mean DAI scores between various age groups. The t test was used to compare the mean DAI scores between sex groups. A probability value of 0.05 or less was set as the significance level. All statistical analyses were performed using the SPSS (statistical package for social science) software in Surveillance & Data Resource Unit, Health System & Infectious Diseases Division (HSID), ICDDR,B.

RESULTS

The study population consisted of 405 college students 17-25 years age in Dhaka and Netrokona. 305(75.3%) were boys and 100(24.7%) were girls. A total of 405 college students were examined (Table 2).

Table 2: distribution of demographic characteristics of study population

Age in years	Boys %(n)	Girls %(n)	Total %(n)
17	38.5 (156)	14.1 (57)	52.6 (213)
18	15.3 (62)	2.2 (9)	17.5 (71)
19	7.4 (30)	3.7 (15)	11.1 (45)
20+	14.1 (57)	4.7 (19)	18.8 (76)
Total	75.3(305)	24.7(100)	100(405)

Among the 405 examined college student, 394 (97.3%) had no missing anterior teeth while 11 (2.7%) had 1 (one) or

more missing anterior teeth. Among the 305 examined boys, 294 (96.4%) had no missing anterior teeth and 11(3.6%) had 1 (one) or more missing anterior teeth. Among 100 examined girls, 100 (100%) had no missing anterior teeth, and 0 (0%) had 1(one) or more missing anterior teeth. A total of 253 (62.5%) college students had no incisal segment crowding, 94 (23.2%) 1 segment crowding and 58 (14.3%) 2 segment crowding. No statistically significant differences in segment crowding were observed in the study group(x). A total of 303 (74.8%) college students had no incisal segment spacing, 78 (19.3%) 1segment spacing and 24 (5.9%) 2 segment spacing. No statistically significant differences in segment spacing were observed in the study group(x). A total of 347 (85.7%) college student had no midline diastema, and 58 (14.3%) had diastema of 1mm. or more. No statistically significant differences in midline diastema were observed in the study group(x). A total of 305 (75.3%) college students had no maxillary anterior irregularity, 70(17.3%) 1-2mm. maxillary

anterior irregularity, and 30 (7.4%) ≥3mm maxillary anterior irregularity. No statistically significant differences were observed in the study group (x) in maxillary anterior irregularity (table 3) A total of 258 (63.7%) college students had no mandibular anterior irregularity, 58 (14.3%) 1-2mm. mandibular anterior irregularity, and 89 (22%) ≥3mm mandibular anterior irregularity. No statistically significant differences were observed in the study group in mandibular anterior irregularity. In the present study, 340 (84%) college student had an anterior maxillary overjet of 0 to 3mm. and 65 (16%) had an overjet of more than 4 mm. Of the boys, 254 (83.3%) had an anterior maxillary overjet of 0 to3mm, and 51 (16.7%) had an anterior maxillary overjet of≥4. Of the girls, 86(86%) had an anterior maxillary overjet of 0 to 3 mm, and 14(14%) had an anterior maxillary overjet of ≥4. No statistically significant differences were observed between boys and girls. Of the 405 examined college student, 376(92.8%) had no mandibular Overjet and 29(7.2%) had a

Table 3:- Distribution of DAI components

DIA components	Boys %(n)	Girls %(n)	Total %(n)	p-value
Missing anterior teeth				
0	96.4 (294)	100 (100)	97.3 (394)	
≥1 teeth	3.6 (11)	0	2.7 (11)	0.042
Incisal segment crowding				
0	60.0(183)	70.0(70)	62.5(253)	
1	23.6(72)	22.0(22)	23.2(94)	0.082
2	16.4(50)	8.0(8)	14.3(58)	
Incisal segment spacing				
0	73.8(225)	78.0(78)	74.8(303)	
1	21.3(65)	13.0(13)	19.3(78)	0.082
2	4.9(15)	9.0(9)	5.9(24)	
Midline Diastema				
0	85.2(260)	87.0(87)	85.7(347)	
≥1	14.8(45)	13.0(13)	14.3(58)	0.664
Maxillary anterior irregularity (mm)				
0	74.1(226)	79.0(79)	75.3(305)	
1-2	18.0(55)	15.0(15)	17.3(70)	0.608
≥3 mm	7.9(24)	6.0(6)	7.4(30)	
Mandibular anterior irregularity (mm)				
0	61.6(188)	70.0(70)	63.7(258)	
1-2	14.8(45)	13.0(13)	14.3(58)	0.289
≥3 mm	23.6(72)	17.0(17)	22.0(89)	
Anterior maxillary overjet (mm)				
0-3 mm	83.3(254)	86.0(86)	84.0(340)	
≥4 mm	16.7(51)	14.0(14)	16.0(65)	0.520
Anterior mandibular overjet (mm)				
0	93.4(285)	91.0(91)	92.8(376)	
>0 mm	6.6(20)	9.0(9)	7.2(29)	0.411
Vertical anterior open bite (mm)				
0	96.1(293)	98.0(98)	96.5(391)	
>0 mm	3.9(12)	2.0(2)	3.5(14)	0.358
Antero-posterior molar relation (mm)				
Normal	61.6(188)	73.0(73)	64.4(261)	
Half cusp deviation	33.4(102)	23.0(23)	30.9(125)	0.116
Full cusp deviation	4.9(15)	4.0(4)	4.7(19)	

*p<.005 significant

Mandibular overjet of more than 0 mm. No statistically significant differences were observed between boys and girls. Among the 405 examined college student, 391(96.5%) had no anterior open bite and 14(3.5%) had an anterior open bite of more than 0 mm. No statistically significant differences were observed between boys and girls. Among the 405 examined college student, 261 (64.4%) had normal molar relationship, and 125(30.9%) had half cusp deviation, and 19 (4.7%) had full cusp deviation. No statistically

significant differences were observed in the study group (Table 3).

In the present study, the distribution of DAI scores and orthodontic treatment needs showed, in case of 17yrs 75.1%, 18yrs 59.2%, 19yrs 57.8%, 20+yrs 64.5% had DAI scores ≤ 25 with no abnormality or little malocclusion requiring no or slight treatment, in case of 17 yrs 14.1%, 18yrs 25.4%,

Table 4: Age wise distribution of DAI scores and orthodontic treatment needs

Age in years	Total %(n)	≤25 %(n)	26-30 %(n)	31-35 %(n)	≥36 %(n)	Mean±SD	Between Components variance
17	52.6(213)	75.1(160)	14.1(30)	7.5(16)	3.3(7)	22.5±6.2	0.046
18	17.5(71)	59.2(42)	25.4(18)	8.5(6)	7.0(5)	24.7±6.8	
19	11.1(4.5)	57.8(26)	17.8(8)	15.6(7)	8.9(4)	25.0±7.0	
20+	18.8(76)	64.5(49)	26.3(20)	6.6(5)	2.6(2)	23.5±5.5	
Total	100(405)	68.4(277)	18.8(76)	8.4(34)	4.4(18)	23.4±6.4	

p>0.005 not significant

19yrs 17.8%, 20+yrs 26.3% had DAI score of 26-30 with definite malocclusion requiring elective orthodontic treatment, in case of 17yrs 7.5%, 18yrs 8.5%, 19yrs 15.6%, 20+yrs 6.6% had DAI score of 31-35 with severe type of malocclusion requiring highly desirable orthodontic treatment, in case of 17yrs 3.3%, 18yrs 7.0%, 19yrs 8.9%, 20+yrs2.6% had DAI score ≥36 with very severe or handicapping malocclusion requiring mandatory type of orthodontic treatment. The mean DAI score was 23.4±6.4 (p<.005). N0 statistically significant difference was observed among the study group in mean DAI score according to age. (Table 4)

Among the 305 examined boys, 201(65.9%) had DAI score ≤25, 59(19.3%) had DAI score of 26-30, 30(9.8%) had DAI score of 31-35, 15(4.9%) had DAI score of ≥36; the mean DAI scores was 23.8. Of 100 girls examined, 76(76.0%) had DAI score ≤25, 17(17.0%) had DAI score of 26-30, 4(4.0%) had DAI score of 31-35, 3(3.0%) had DAI score of ≥36; the mean DAI scores was 21.9. A statistically significant difference was found between the 2 sexes in mean DAI score (table- 5).

Table: - 5 Gender wise distribution of DAI scores orthodontic treatment needs

Gender	Total %(n)	≤25 %(n)	26-30 %(n)	31-35 %(n)	≥36 %(n)	Mean±SD	95%CI
Males	75.3(305)	65.9(201)	19.3(59)	9.8(30)	4.9(15)	23.8±6.5	23.1-24.6*
Females	24.7(100)	76.0(76)	17.0(17)	4.0(4)	3.0(3)	21.9±5.5	20.9-23.7
Total	100(405)	68.4(277)	18.8(76)	8.4(34)	4.4(18)	23.4±6.4	22.7-24.0

F=11.82, P<0.005 .significant*,

In the present study, 277(68.4%) college students had DAI score ≤25 with no or little malocclusion requiring no or slight orthodontic treatment, 76(18.8%) had DAI score of 26-30 with definite malocclusion requiring elective orthodontic treatment, 34(8.4%) had DAI score of 31-35 with severe type of malocclusion requiring highly desirable orthodontic treatment, 18(4.4%) had DAI score ≥36 with very severe or handicapping malocclusion requiring mandatory orthodontic treatment (Table 6).

Table 6: Prevalence of malocclusion and orthodontic treatment needs of study population

%(n)	DIA %(n)	Severity of malocclusion	Treatment need	Mean±SD
68.4(277)	≤25	No abnormality or minor occlusion	No or slight need	19.9±2.8
18.8(76)	26-30	Definite malocclusion	Elective	27.6±1.4
8.4(34)	31-35	Severe malocclusion	Highly desirable	32.6±1.6
4.4(18)	≥36	Very severe or handicapping malocclusion	Mandatory	41.2±6.0

Table 7: shows the mean DAI score of Bangladeshi young adults and other populations

Population	Sample size	Age range	Mean(SD) DAI score	95%CI
Caucasian Americans	1337	7-12	26.5(7.8)	26.1-26.9
Native Americans	485	7-12	31.8 -	-
Caucasian (S.Australia)	5000	13	28.1 -	-
Japanese	409	15-18	30.5(8.3)	29.7-31.3
Caucasian Australians	268	12-16	24.1(6.4)	23.3-24.9
Poles	1000	12-13	24.5 -	-
Malaysian	1512	12-13	24.6(13.6)	-
Chinese (Taiwan)	176	18-24	22.3 -	-
Spanish	744	14-20	25.6(7.9)	-
Nigerian	703	12-18	22.3(5.8)	21.9-22.8
Peru	267	16-25	28.87 -	-
Iranians	900	12-15	23.5(6.0)	23.1-23.9
Indian	1800	12-15	19.3(4.8)	
Bangladeshi (present study)	405	17-25	23.4(6.4)	22.7-24.0

SD=standard deviation; CI=95% confidence interval

The mean DAI scores of Bangladeshi young adults were almost similar to Iran, Nigeria, Chinese (Taiwan), Malaysia, Poland and Caucasian Australians, But higher than in India and lower than in Peru, Spain, Japanese, Caucasian (S.Australia), Native Americans and Caucasian Americans (Table 7).

DISCUSSION

Missing anterior teeth

The number of missing permanent incisor, canine and premolar teeth in the upper and lower arches was recorded. A history of all missing anterior teeth was obtained to determine whether extractions were performed for aesthetic reasons. Teeth were not recorded as missing, if spaces were closed, if a primary tooth was still in position and its successor had not yet erupted, or if a missing incisor, canine, or premolar tooth had been replaced by a fixed prosthesis.[6] In the current study, 2.7% of the study population had one or more missing anterior teeth either in the maxilla or in the mandible, the differences of which between boys and girls were not statistically significant. This result is similar to Iran 2.9%,[12] Australia (Victoria) 2.9%,[13] India (Devangere) 3.4%,[14] Spain 3.5%[15], Nigeria 3.7%[10] but contrast to Malaysia 6.9%,[16] india10.7%,[17] Nepal 12.6%[18] and Peru 16.5%.[19] These differences may be due to genetic, environmental, food habit, oral hygiene motivation level, treatment facilities and treatment cost.

Incisal segment crowding

Crowding of the incisal segment is a condition in which the available space between the right and left canine teeth is insufficient to accommodate all four incisors in normal alignment; as a result teeth may be rotated or displaced out of the arch.[6] In the present study; 37.5% of the study population had 1-2 segments crowding which were not statistically significant between the sex groups. This result is almost similar with the result of Iran (38.3%),[12] India (38.7%),[17] Nigeria (33.6%),[10] India (Nagpur) 31.8%,[20] India (Devangere) 37.5,[14] Australia (Victoria) 42.5%[13] but not with Spain (76.3%)[15] Peru (90.6)[19]and Nepal 52.9%,[18] Malaysia 50.3%.[16] This may be due to the racial or genetic composition of the study groups as well as abnormal tooth position, which commonly lead to crowding of teeth. M.H. Sattar and colleagues; Bangladesh found (53.7%),[21] this may be due to differences in materials and method.

Incisal segment spacing

Incisal segment spacing is a condition in which the amount space available between the right and left canine teeth exceeds that required to accommodate all four incisor in normal alignment. In the current study if one or more incisor teeth had proximal surfaces lacking interdental contact, the segment was recorded as having space.[6] Both the upper and lower incisal segment was examined for spacing. In the present study, 25.2% of the study population had incisal segment spacing either in one or both arches. This is almost similar with Peru (25.1%)[19] and Iran (21.3%)[12] but not with Spain (13.3%),[15] India (15.7%),[17] Australia (Victoria) 14.1%,[13] Malaysia 17.4%[16] and higher in Nepal 30%,[18] MH Sattar, Bangladesh (36.6%)[21], Nigeria (44.2%)[10]. This differences could attributed to missing or undersized lateral incisors; parafunctional habits such as thumb sucking, mouth

breathing, tongue thrusting, rotated incisors, anodontia, macroglossia and dentoalveolar discrepancies. This was due to genetic and regional variation. Differences in Bangladesh may be due to differences in materials and method.

Midline diastema

Midline diastema is defined as the space, in millimeter, between the two maxillary incisors at the normal position of the contact points.[6] In the present study 14.3% of the study population had midline diastema. This is similar to Australia (Victoria) 14.1%,[13] Peru (13.1%)[19], India (15.3%),[17] Iran 16.7%,[12] Nepal 16%[18] but lesser in Spain 9.8%,[15] Malaysia 9.3%[16] and higher in Nigeria 24.9%[10] No statistical significant differences were observed. The difference could be attributed to tooth size and arch discrepancies, genetic, environmental factors and ethnic variation.

Maxillary anterior irregularity

Maxillary anterior irregularity may be either rotations out of or displacements from normal alignment. Incisor in the maxillary arch should be examined for identification for greatest irregularity. Irregularities may occur with or without crowding. In the current study, if sufficient space was available for all four incisors in normal alignment but some teeth were rotated or displaced, the largest irregularity was recorded.[6] Of the 405 examined students, 24.7% had a maxillary anterior irregularity of ≥1mm, similar with the study of India (23.0%)[17] but lesser in Australia (Victoria) 18.2%,[13] Iran17.8%,[9] Nigeria 12.1%,[10] results in Malaysia 40.6%,[16] Peru (76.0%)[19] and Spain 60.8%[15] showed a higher incidence of anterior maxillary irregularities. The difference could be attributed to crowding predisposition caused by genetic, environmental factors regional and ethnic variation.

Mandibular anterior irregularity

Mandibular anterior irregularity may be either rotations out of or displacements from normal alignment. Incisor in the Mandibular arch should be examined for identification of greatest irregularity.[6] In the present study 37.3% of the study population had a mandibular irregularity of ≥1 mm. Result of other studies showed a higher incidence in Peru (85.4%),[19] Spain 72.6%,[15] but lesser in Malaysia 22.2%,[16] Iran15.6%,[12] Nigeria 29.2%[10] and India 18.1%.[17] This is due to racial or genetic composition of the study groups. In the current study irregularities were more prevalent in the mandible than maxilla.

Anterior maxillary overjet
Anterior maxillary overjet is a measurement of the horizontal

relationship of the incisor with the teeth in centric occlusion. The distance from the labial-incisal edge of the most prominent upper incisor to the labial surface of the corresponding lower incisor was measured.[6] Results of current study indicated that 84.0% subjects presented with a normal maxillary overjet of 0-3 mm. and 16.0% presented with an overjet of ≥4mm, close to Nigeria 14.1%[20], less in India 6.7%,[17] Iran 12.9%,[12] more in Peru (20.6%),[19] Spain 19.8%[15] and Malaysia 41.5%.[16] This could due to differences in geographical location and ethnic variation.

Anterior mandibular overjet

Anterior mandibular overjet was recorded when any lower incisor protruded anteriorly or labially to the opposing upper incisor. Mandibular overjet was not recorded if a lower incisor was rotated so that one part of the incisal edge was in cross bite (i.e. labial to the upper incisor).[6] Anterior Mandibular overjet indicates a class III malocclusion or anterior cross bite. In the present study, > 0 mm. mandibular overjet was found 7.2%, Slightly higher than Malaysia 3.1%,[16] Spain 4.5%,[15] India 0.4%,[17] Nigeria 1.4%,[10] Peru 2.6%,[19] Iran 2.0%.[12] These differences could be attributed to genetic predisposition, variation in growth, or disproportion in the dento-alveolar width.

Vertical anterior open bite

Anterior open bite is a lack of vertical overlap between any of the opposing pairs of incisors (open bite). This condition reflects discrepancies in the vertical plane of space.[6] In the present study 3.5% students presented with vertical anterior open bite ranging from > 0 mm. Results were similar to Iran (3.1%),[12] Saudi (3.6%),[22] Spain (3.6%)[15] but higher than Peru(1.9%),[19] India(2.4%),[17] Malaysia 2.0%,[16] and lesser than Nigeria (10.2%)[10] These differences may be due to variation in development and maturation of the arches. Results of M Z Hossain, Bangladesh (0.99%)[23] contrasts with the current study. These differences may be due to differences in sample size and materials and method.

Anteroposterior molar relationship

The anteroposterior molar relationship is most often based on the relationship between the permanent upper and lower first molar. The right and left side were assessed with teeth in occlusion and only the largest deviation from the normal relationship (Angle Class-I) was recorded.[6] In the current study, 64.4% of the students had normal Anteroposterior molar relationships i.e. Class I. Among the affected group 30.9% had half cusp deviation and 4.7% had full cusp deviation. Results of Class I (64.4%) are close to M Z

Hossain, Bangladesh (55.22%)[23] and MH Sattar, Bangladesh (76.5%),[21] Spain (56.7%),[15] Malaysia 68.0%[16] where the IOTN based results by Fatema, Bangladesh (33.8%) showed a large difference. Results of half a cusp deviation ((30.9%), close to Peru (35.6%),[19] Spain (29.2%),[15] but not with Iran (46.4),[12] Nigeria (16.2%),[10] Malaysia 22.7%[16] and India (5.2%).[17] Results of full cusp deviation (4.7%) are similar to India (4.7%),[17] but contrast to Malaysia 9.3%,[16] Peru (16.5%)[19] and Spain (14.1%).[15] These may be due to regional and ethnic variation.

DAI score distribution

In the present study, 277(68.4%) college students had DAI score ≤25 with no or little malocclusion requiring no or slight orthodontic treatment, 76(18.8%) had DAI score of 26-30 with definite malocclusion requiring elective orthodontic treatment, 34(8.4%) had DAI score of 31-35 with severe type of malocclusion requiring highly desirable orthodontic treatment, 18(4.4%) had DAI score ≥36 with very severe or handicapping malocclusion requiring mandatory orthodontic treatment. In the present study, the findings in young adults with DAI scores ≤ 25 correlated almost with Malaysia 62.6%[16] Iran(70.1%),[12] Spain(58.6%),[15] Nigeria (77.4%),[10] India(79.9%).[17] Lesser prevalence of DAI scores ≤ 25 has been observed in Peru[19] (41.9%). Definite treatment need in12.8%, Iran (12.1%),[12] Malaysia 17.8%,[16] Spain (21.1%),[15] Nigeria (9.2%),[10] India (4.7%)[17] The reason for these differences in DAI scores could be due to inherited differences in tooth size and arch size. It is heartening to note that the findings from this study showed that most subjects (68.4%) had a good dental appearance which did not require treatment. This proportion appears small, if extrapolated to the whole young population it would impose a tremendous orthodontic treatment load.

Mean DAI score

Comparison with other previously published studies demonstrated that the mean DAI score for the evaluated young adults (23.4), correlate with Iranians (23.5),[12] Malaysian (24.6),[16] Chinese (25.9), Caucasian Australians (24.1), Chinese (Taiwan) (22.3), Nigerian (22.3),[10] but lower than that in Caucasian Americans (26.5), Peruvians (28.8),[19] Japanese (30.5),[11] and Spanish (25.6),[15] but higher than those reported for Indian (19.3).[12,24] Large differences between the mean DAI scores of Bangladeshi and those of Americans, Peruvians and Japanese may be due to racial variation. Also difference may be due to different sample size and / or age ranges. Compared with the study of Japan, similar sample size of Bangladeshi students had less orthodontic treatment need. Differences in DAI scores might be attributed to

genetic predisposition, differences in lifestyle, variation in growth of facial skeleton development and occlusion.

Gender wise mean DAI score distribution

In this study, the mean DAI scores for males and females were 23.8 and 21.9 respectively which is significant (p<.005). Girls tended to have lower DAI scores than boys. This is comparable to mean DAI scores found in Iranian[12] and also in Malaysian.[16] This results were contrast with the reports of Nigeria,[10] Peru,[19] Spain[15] which did not find any significant sex differences in the mean DAI score. This difference may be attributed to difference in region, geographical location, and gender.

CONCLUSION

This study has shown that when the DAI was used to assess orthodontic treatment need in Bangladeshi young adults, most of the students (68.4%) had a good dental appearance with no need for orthodontic treatment. One-eighth of the young population (12.8%) had definite malocclusion requiring definite orthodontic treatment. Male students are more prone to definite malocclusion and the need for orthodontic treatment. In this population, DAI components showed no significant differences but were characterized by a relatively high frequency of incisal segment crowding, mandibular anterior irregularity and half cusp anteroposterior molar relationships. Bangladeshi students have better dental appearance than many other countries around the world. Future research on the DAI must to evaluating its validity longitudinally.

REFERENCES

1. Onyeaso CO, Sanu oo. Perception of personal dental appearance in Nigerian adolescents. Am J Orthop 2005; 127:700-706.
2. Mitchell L, Carter NE, Doubleday B. Chapter 1. An introduction to Orthodontics. 2nd edition. Oxford University Press; 2001:5-10
3. Houston WJB. Chapter 6. dontiWalther's Orthoc Notes. 4th edition. The Stonebridge Publishers.2000; 46-50.
4. Poonacha et el: Dental Aesthetic Index: Applicability in Indian population: A retrospective study. J INDIAN SOC PEDOD PREVENT DENT I Jan- Mar 2010 I Issue 1I Vol 28 I
5. Joanna Jenny, Naham C. Cons. Establishing malocclusion severity levels on the Dental Aesthetic Index (DAI) scale. Australian Dental Journal 1996; 41(1):43-6.
6. World Health Organization. Chapter 5.Oral Health Survey, Basic Methods. 4th edition.
7. Nihal Hamamci, Guvenc Basaran, Ersin Uysal.Dental Aesthetic Index scores and perception of personal dental appearance among Turkish university syudents.European Journal of Orthodonticcs 31(2009) 168-173.
8. Cons NC, Jenny J, Kohout FJ, Jakobsen J, Shi Y, Ying WH, Pakalns G. Comparing ethnic group-specific DAI equations with the standard DAI. Int Dent J. 1994; 44:153–158.

9. Cons NC, Jenny J, Kohout FJ, Songpaisan Y, Jotikastira D. Utility of the dental aesthetic index in industrialized and developing countries. J Public Health Dent. 1989; 49:163–166.

10. Otuyemi OD, Ogunyinka A, Dosumu O, Cons NC, Jenny J. Malocclusion and orthodontic treatment need of secondary school students in Nigeria according to the Dental Aesthetic Index (DAI). Int Dent J. 1999; 49:203–210.

11. Ansai T, Miyazaki H. Katoh Y, Yamashita Y, Takehara T, Jenny J, Cons NC. Prevalence of malocclusion in high school students in Japan according to the Dental Aesthetic Index. Community Dent Oral Epidemiol 1993; 21:303-305.

12. S.M. Danaei, F. Amirrad and P. Saleh. Orthodontic treatment needs of 12-15-year-old students in Shiraz, Islamic Republic of Iran. Eastern Mediterranean Health Journal, Vol.13,No 2,2007

13. L.J. Estioko, F.A.C. Wright and M.V. Morgan. Orthodontic treatment need of secondary schoolchildren in Heidelberg, Victoria: an epidemiologic study using the Dental Aesthetic Index. Community Dental Health (1994) 11, 147-151.

14. No 1 Naveen Kumar B, Ashok Mohapatra, Ramash N, Ravishankar tl.prevalence of malocclusion and orthodontic treatment need among 12-15 years old school children in davangere, karnataka, india. Pakistan Oral & Dental Journal June 2010,vol 30.

15. Baca-Garcia A, Bravo M, Baca P, Baca A, Junco P. Malocclusions and orthodontic treatment needs in a group of Spanish adolescents using the Dental Aesthetic Index. Int Dent J. 2004; 54:138–142.

16. Rashidah Esa, Ishak Abdul Razak, and Joan H. Allister. Epidemiology of Malocclusion and orthodontic treatment need of 12-13-year –old Malaysian schoolchildren. Community Dental Health (2001) 18, 31-36.

17. KM Shivkumar, GN Chandu, MD Shafiulla. Severity of Malocclusion and Orthodontic Treatments needs among 12-to15-Year- Old School Children of Davangere District,Karnataka, India. European Journal of dentistry. July 2010-vol. 4.

18. Sharma J N.pattern of distribution of malocclusion in patients seeking orthodontic treatment at bpkihs from sunsari district of nepal. Health Renaissance. May-Aug 2010: Vol 8 (NO.2) 93-96.

19. Eduardo Bernabea, Carlos Flores-Mir. Orthodontic Treatment Need in Peruvian Young Adults Evaluated Through Dental Aesthetic Index. Angle Orthodontist, Vol 76, No 3, 2006.

20. JT Nainani, Sugandh Relan.Prevalence of Malocclusion in School Children of Nagpur Rural Region-An Epidemiological study. JIDA, Vol. 5, No 8, August 2011.

21. Sattar M. H, Khaleque K. A, Haq M. E, Study of Malocclusion among in Dhaka Dental College; An Epideiological overview. BDJ, 1997; 12: 4-16.

22. Sulaiman AL-Emran, Per Johan Wisth, Olav E. Boe. Prevalence of malocclusion and need for orthodontic treatment in Saudi Arabia. Community Dent Oral Epidemiol 1990; 18:253-5 .

23. M.Z. Hossain. The Prevalence of malocclusion in DDCH; 1990; Journal of Oral Health, BsD"1(1); 1994.

24. Katoh et el. A Comparison of DAI scores and characteristics of occlusal traits in three ethnic groups of Asian origin. International Dental Journal (1998) 48, 405-411.

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