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A Study on the Significance of Orthodontic Treatment among Bangladeshi School Children

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Abstract **Original Research Article**

Introduction: The treatment of malocclusion places a considerable burden on health care resources globally, particularly when funded by public means. In an attempt to prioritize the treatment of malocclusion, various occlusal indices have been developed based on the severity of malocclusion and/or the conceivable destruction it may cause to oral health if left untreated. However, it has been recognized that perhaps people seek and undergo orthodontic treatment not because of anatomic irregularities, but because of the consequences of the esthetic impairment caused by a malocclusion. Thus, malocclusion and orthodontic care have become a quality-of-life issue. This study aimed to assess the significance of orthodontic treatment according to an index (Index of Orthodontic Treatment Need) among Bangladeshi school children in the late mixed dentition stage. ***Methods:*** This Cross-sectional descriptive study was conducted at the Ideal School, Banasree Project, Rampura, Dhaka, and Faizur Rahman Ideal School, Banasree, Dhaka, Bangladesh. The study was conducted from 25th September 2010 to 25th January 2011. A total of 126 school children were included in this study. ***Result:*** Among 126 school children, 39.68% belonged to the age of 10, 24.61% were the age of 11, and the rest 35.71% belonged to the age of 12. The study showed male predominance, having 75 (59.52%) males and 51 (40.48%) females. Among the study population, 19% of the children came from a family whose monthly income was 20000tk, while 13.50% and 11.90% of the children belonged to families whose income were 18000tk and 15000tk respectively and the rest of the families whose parent's monthly income was less than 15000tk. About 50% of school students were diagnosed as Grade 1, 22.2% were in Grade 2, 24.6% were in Grade 3, 1.6% was in Grade 4 and 1.6% were in Grade 5. 28 respondents of age 10 years; 10 respondents of age 11 years; 25 respondents of age 12 years needed no treatment. 11 respondents of age 10 years; 8 respondents of age 11 years; 9 respondents of age 12 years needed Grade 2 treatment. 7 respondents of age 10 years; 13 respondents of age 11 years; 11 respondents of age 12 years needed Grade 3 treatment. Only 2 respondents of age 10 years went through the severe need for treatment (Grade 4). Only 2 respondents of age 10 years went through Grade 5/extreme need of treatment. According to the IOTN assessment, it was found that 39 male and 24 female respondents needed no treatment, 9 male and 19 female respondents needed mild/no treatment (Grade 2), 25 male and 6 female respondents needed moderate/borderline (Grade 3) treatment, only 2 female respondents needed severe (Grade 4) treatment and last of all only 2 male respondents were in the extreme need treatment group. For age, the standard error of the mean was 0.078, the standard deviation was 0.871 and the variance was 0.758. ***Conclusion:*** The results of this study concluded that the prevalence and treatment needs are slightly higher for younger children than for older groups. About 50.0% of respondents did not need treatment (grade 1) according to IOTN categories, and 24.6% of respondents were in moderate treatment need (grade 3) which indicated a great significance of orthodontic treatment among school children in this region of the globe. The use of mixed dentition stage rather than chronological age as inclusion criteria for surveys using the IOTN also needs to be explored.

Keywords: Malocclusion, Orthodontic, IOTN, IPION.

INTRODUCTION

Protruding, irregular, or malocclusion teeth can cause several problems for patients such as discrimination because of facial appearance, problems with oral function, including difficulties in jaw movement (muscle incoordination or pain), temporomandibular joint dysfunction (TMD), and problems with mastication, swallowing or speech, greater susceptibility to trauma, periodontal disease or

tooth decay [1]. Physical appearance may be the single variable feature having the greatest impact on self-esteem, behavioral patterns, and personal interactions. Orthodontics is one of the disciplines sharing the opportunity of providing children with a confident smile and functional occlusion, thereby improving their quality of life [2]. Malocclusions have significant clinical variations from the normal range of growth and morphology. In contrast to disease and pathological lesions, malocclusion may be the result of a combination of minor variations from the normal; each is too mild to be classed abnormal but their combination summates to produce a clinical problem [3]. Consumers perceived needs are based on their awareness of the potential disease and personal experience and depend on culture, religion, education, and social status. As such, they are an important determinant of consumer behavior, i.e. a determinant of what economists call demand [4]. Demand, therefore, reflects the ability of individuals to translate perceived needs into professional contact, and this in turn is determined by organizational factors such as economy, time, ease and convenience of access, and income [5]. As public interest in oral health increases, the demand for orthodontic treatment will also increase; it is important to have orthodontic data to estimate the total need for orthodontic care services [6] the data on orthodontic treatment needs is of interest to the dental public health programs, clinical treatment, screening for treatment priority, resource planning, and third party funding [7]. Provincial oral health management requires accurate data on the prevalence, distribution, and severity of malocclusion and the orthodontic treatment need of its child population. Such data is essential for the effective planning of education, training, and development of dental manpower and resources as well as the distribution thereof [8, 9]. Several indices for scoring how much the teeth deviate from the normal, as indicators of orthodontic treatment needs. [10] Shaw and co-workers in the UK developed a scoring system for malocclusion, the Index of Treatment Need (IOTN) [11], that places patients in five grades from “no need of treatment” to “treatment need”. The index has a dental health component derived from occlusion and alignment. IOTN grades seem to reflect clinical judgments better than previous methods [12, 13]. There is a surprisingly good correlation between treatment needs assessed by the dental health and components of IOTN (i.e. children selected as needing treatment on one of the scales are also quite likely to be selected using the other). The assessment of orthodontic needs is difficult, controversial, and varies, partly due to the lack of uniformity in diagnosis and partly due to a variety of social factors in each community. Thus in some countries, missing or irregular teeth are a social embarrassment and stigma, whereas in other communities they are hardly noticed [14]. This study aimed to assess the significance of orthodontic treatment according to an index (Index of Orthodontic Treatment Need)among Bangladeshi school children in the late mixed dentition stage.

OBJECTIVE

General Objective

- To evaluate the significance of orthodontic treatment among Bangladeshi school children (10-12-year-old students) by using the Index of Orthodontic Treatment Need (IOTN).

Specific Objectives

- To establish reliable baseline data regarding prevalence, distribution, and severity of malocclusion of 10 to 12 years old children in selected schools in Bangladesh.
- To diagnose or guide the probable treatment protocol with the management of found cases.
- To determine if the malocclusion, as defined by the IOTN is affected by socio-demographic variables.

METHODS

This Cross-sectional descriptive study was conducted at the Ideal School, Banasree Project, Rampura, Dhaka, and Faizur Rahman Ideal School, Banasree, Dhaka, Bangladesh. The study was conducted from 25th September 2010 to 25th January 2011. A total of 126 school children were included in this study. Clinical examination of the students was done after taking verbal consent from the class teachers as well as from the respondents. To collect the data a structured questionnaire and a checklist were prepared. Ethical clearance was obtained from the ethical Committee of Bangabandhu Sheikh Mujib Medical University (BSMMU), Shahbagh, Dhaka. Data analysis was done using statistical software Statistical Package for Social Science or SPSS 12 for Windows version and Microsoft excel according to key variables and objectives of the study.

Inclusion Criteria

- All students (10-12 years) attending in school time of Ideal School, Banasree Project, Rampura, Dhaka Patients who had given consent to participate in the study.
- All co-operating students.

Exclusion Criteria

- Respondents who have already taken orthodontic treatment.
- Respondents who were on orthodontic treatment.
- Non-co-operative students.

RESULTS

Among 126 school children, 39.68% belonged to the age of 10, 24.61% were the age of 11 and the rest

35.71% belonged to the age of 12 [Table 1]. The study showed male predominance, having 75 (59.52%) males and 51 (40.48%) females [Table 2]. Among the study population, 19% of the children came from a family whose monthly income was 20000tk, while 13.50% and 11.90% of the children belonged to families whose incomes were 18000tk and 15000tk respectively, and the rest of the family whose parent's monthly income was less than 15000tk [Table 3]. About 50% of school students were diagnosed as Grade 1, 22.2% were in Grade 2, 24.6% were in Grade 3, 1.6% was in Grade 4 and 1.6% was in Grade 5 [Table 4]. 28 respondents of age 10 years; 10 respondents of age 11 years; 25 respondents of age 12 years needed no treatment. 11 respondents of age 10 years; 8 respondents of age 11 years; 9 respondents of age 12 years needed Grade 2 treatment. 7 respondents of age 10 years; 13 respondents of age 11 years; 11 respondents of age 12 years needed Grade 3 treatment. Only 2 respondents of age 10 years went through the severe need for treatment (Grade 4). Only 2 respondents of age 10 years went through Grade 5/extreme need of treatment [Table 5]. According to the IOTN assessment it was found that 39 male and 24 female respondents needed no treatment, 9 male and 19 female respondents needed mild/no treatment (Grade 2), 25 male and 6 female respondents needed moderate/borderline (Grade 3) treatment, only 2 female respondents needed severe (Grade 4) treatment and last of all only 2 male respondents were in extreme need treatment group [Table 6]. For age, the standard error of the mean was 0.078, the standard deviation was 0.871 and the variance was 0.758 [Table 7].

Table 1: Distribution of respondents according to their age (N=126)

Age	N	%
10	50	39.68
11	41	24.61
12	45	35.71
Total	**126**	**100.0**

Table 2: Distribution of respondents by their sex (N=126)

Sex	N	%
Male	75	59.52
Female	51	40.48
Total	**126**	**100.0**

Table 3: Distribution of respondents by their parents' monthly income (N=126)

Income (BDT)	N	%
10000	9	7.1
12000	3	2.4
14000	3	2.4
15000	15	11.9
16000	2	1.6
18000	17	13.5
19000	2	1.6
20000	24	19.0
22000	3	2.4
23000	5	4.2
24000	5	4.0
25000	11	8.7
26000	2	1.6
28000	6	4.8
30000	12	9.5
35000	5	4.0
40000	2	1.6
Total	126	100.0

Table 4: Distribution of respondents according to IOTN (N=126)

Grade	N	%
Grade 1 (No Need)	63	50.0
Grade 2 (Mild/ No Need)	28	22.2
Grade 3 (Moderate/ Borderline)	31	24.6
Grade 4 (Severe/ Need Treatment)	02	1.6
Grade 5 (Extreme/ Need Treatment)	02	1.6
Total	**126**	**100**

Table 5: Correlation with the grading of treatment need and age of the respondents (N=126)

Grading of treatment need	Age (years)			Total
	10	11	12	
Grade 1 (No Need)	28	10	25	63
Grade 2 (Mild/ No Need)	11	08	09	28
Grade 3 (Moderate Need)	07	13	11	31
Grade 4 (Severe Need)	02	00	00	02
Grade 5 (Extreme Need)	02	00	00	02
Total	50	31	45	126

Table 6: Correlation with the grading of treatment need and sex of the respondents (N=126)

Sex	Grading of treatment need					Total
	Grade 1 (No Need)	Grade 2 (Mild Need)	Grade 3 (Moderate need)	Grade 4 (Severe Need)	Grade 5 (Extreme Need)	
Male	39	09	25	00	02	75
Female	24	19	06	02	00	51
Total	63	28	31	02	02	126

Table 7: Descriptive statistics of age, income, overjet, reverse overjet, and overbite (N=126)

Topic	N	Mean		SD	Variance
	Statistic	Statistic	Std. Error	Statistic	Statistic
Age	126	10.96	0.078	0.871	0.758
Income	126	21111.11	591.71231	6641.954	4.407
Overjet	126	3.0397	0.016052	1.80178	3.246
Reverse overjet	126	0476	0.02140	0.24024	0.058
Overbite	126	2.7937	0.11929	1.33906	1.793
Valid N	126	-	-	-	-

DISCUSSION

In this study, the distribution of school children according to age among 126 school children, 39.68% belonged to the age of 10, 24.61% was the age of 11 and 35.71% belonged to the age of 12 correlates with another study where 20.30% belonged to 10 years, 40.10% belonged to 11 years and 32% belonged to 12 years among patients attending at Dhaka Dental College and Hospital [15]. This study correlates with another study; i.e. during the second period of the mixed dentition when a canine erupts or an increase in overjet becomes noticeable to the patients and parents. Initiation of treatment at this time may be indicated in subjects with moderate crowding but without bite anomalies. However, patients with discrepancies in occlusion, impairment of voluntary movement, and abnormalities in tooth number require earlier intervention. In these cases, early intervention performs a similar function to interceptive orthodontics by preventing progression to the full form of a given disorder and excluding factors interfering with the regular development of the dental arches [16, 17]. A slightly less number of female respondents were found in the population which was about 40.50% and the male population was about 59.59%. The distribution concerning males and females of orthodontic treatment needs has been studied by several researchers and one researcher found significantly more males than females were in the need of orthodontic treatment, which correlates with this present study. But socioeconomic condition beauty/aesthetic is a prime requirement of a female for her marriage. So, there were more female patients than males in comparison to other studies [18]. About 19% of the children came from a family whose monthly income was 20,000 taka, while 13.50% and 11.90% of the children belonged to families whose incomes were 18,000 taka and 15,000 taka respectively, and the rest of those whose parents' monthly income was less than 15,000 taka. According to income, the majority of the respondents belong to three groups, that was taka 6,000-10,000 (36.50%), taka 11,000-15,000 (28.45%), and below taka 6,000 21.20% was found in another study [15]. The rating of IOTN in this study population was found to be as follows- grade 1- 50%, grade 2- 22.20%, grade 3- 24.60%, grade 4- 1.60%, grade 5- 1.60% whereas 36.59% was found in grade 5, 22.10% in grade 4, 24.30% in grade 3 and 17.10% in grade 2 in another study [15]. A study found that malocclusion describes a spectrum of deviation from the normal or ideal to very severe anomalies [19]. Clinicians and potential patients and their families may have different views of what should be treated and what should be accepted as a modest and harmless variation. The IOTN is a useful tool for those interested in research into dental public health and epidemiology of malocclusion but it is widely used by the specialist. From 1st April 2006, the use of IOTN was made compulsory in the Govt. (NHS) funded orthodontics in the UK [20-22]. Regarding orthodontic treatment only a few studies dealt with preventive and interceptive

orthodontics; one Canadian study applied a specific index for mixed dentition called the "Index for Preventive and Interceptive Orthodontic Need (IPION)" [23]. Although the IPION is a very useful tool, it lacks the sensitivity necessary for deciding which cases to accept for preventive or interceptive orthodontic treatment. Two studies were conducted in the United States, two were performed in Finland; [24, 25] and two in South Africa [26]. Despite this low number of reports, many clinicians considered early intervention as a viable option in many malocclusion cases in early and later mixed dentition. In Bangladesh, the demand for orthodontic treatment is increasing; nevertheless, the resources required are insufficient.

Limitations of the Study

The study was conducted in two schools in Bangladesh with small sample size. So, the results may not represent the whole community. It could be suggested that these values might differ between geographical areas.

CONCLUSION

The result of this study indicated a high prevalence, distribution, and severity of malocclusion as well as useful epidemiological data on importance of orthodontic treatment of 10-12-year-old children in selected urban areas in Bangladesh. At present, there is no doubt that many children with severe and handicapping malocclusion are not receiving adequate orthodontic treatment. The number of children likely to need orthodontic care and the already high prevalence of malocclusion necessitate the careful planning of adequate orthodontic services in Bangladesh. Orthodontic services should therefore be comprehensive, delivering appropriate treatment in response to the specific situation, resulting in efficient treatment of non-skeletal and skeletal problems. The results of this study and others studies conducted elsewhere using the IOTN, it appears that the prevalence is slightly higher for younger children than for older groups.

FUNDING

No funding sources.

CONFLICT OF INTEREST

None declared.

ETHICAL APPROVAL

The study was approved by the Institutional Ethics Committee.

RECOMMENDATION

Additional in-depth research is needed consisting of a large population group. As it emphasizes the importance of orthodontic treatment on a priority basis it may be recommended to be introduced in government hospitals for proper selection of orthodontic patients which will compromise the excessive patient load. Both an early diagnosis and timely orthodontic referral can help reduce the possibility of more complex treatments, thus saving time and money.

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