

Orthodontic Treatment Needs among 9-12 Years Old Children in the Emirate of Ajman, United Arab Emirates

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ABSTRACT

Aim: To assess the orthodontic treatment needs of 9- to 12-year-old children using the index orthodontic treatment need (IOTN) and to determine its association with gender and age.

Materials and Methods: One experienced examiner evaluated the IOTN's Dental Health Component (DHC) and its Aesthetic Component (AC) in 300 individual (167 females and 133 males) with a mean age of 10.0 years who had come for dental check-up to the College of Dentistry of Ajman University of Science and Technology during a certain period of time. A Chi-square test was used to analyze the IOTN results by gender and age.

Results: The DHC showed that 44.9% of the children had no or little need while 28.3% were on borderline category, and 26.8% showed a great need for treatment. There was no significant difference between genders according to the DHC grade of the IOTN ($P = 0.763$). In evaluating the AC, 48.7% were laid in the no-need or little-need category, 31.0% were in the moderate-need, and 20.3% placed in the great-need to orthodontic treatment.

Conclusions: The outcomes of this study indicated that one-quarter of the contributed children are in need for orthodontic treatment, crowding and increased over jet were the most common occlusal features.

Keywords: Dental Health Component, Aesthetic Component, Index Orthodontic Treatment Need

INTRODUCTION

The need for orthodontic treatment is influenced by a number of factors including cultural, peer, parental, and self-perception of dental beauty. The demand for orthodontic treatment is increasing in most of the countries including the United Arab Emirates (UAE). Therefore, rational planning of orthodontic preventive measures on a population basis is essential. This highlight the importance of epidemiological studies in order to obtain knowledge about the prevalence of different types of malocclusion and the need for

orthodontic treatment, and in accessing the resources required for such services.

Several indices have been developed to assess the orthodontic treatment need in the particular population. One of the most widely applied indices for assessment orthodontic treatment's need is the Index of Orthodontic Treatment Need (IOTN) introduced by Brook and Shaw in 1989.^[1] The IOTN classifies malocclusions according to the presence of particular occlusal features considered important for dental health and esthetics in order to identify individuals who would benefit most from the orthodontic treatment. This index consists of two separate components: Dental Health Component (DHC) and Aesthetic Component (AC). The DHC incorporates various occlusal traits, ranged in five-grades while the AC consists of a 10-color-photographs scale is showing the different levels of dental attractiveness. The validity and reliability of the IOTN have been established in

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the previous studies conducted by Richmond *et al.*,^[2] and by Christopherson *et al.*^[3] Since its introduction, the IOTN has been widely applied by orthodontists all over the world.^[4,5] The assessment of malocclusion and treatment need for public health purposes is crucial for planning orthodontic care service; such data are not available for the population of the UAE.

The aim of this study was to assess the orthodontic treatment's need among a group of children aged 9-12 years, using the IOTN index as well as to determine the possible factors associated with this necessity.

MATERIALS AND METHODS

There are no reports in the literature of the IOTN in UAE, the purpose of the present study was to determine the prevalence of malocclusion among a group of 9- to 12-year-old school children came to the College of Dentistry of Ajman University of Science and Technology (AUST) for a dental check-up over the period of 1 month in March 2013. This age group was chosen to provide sufficient participants who had all or almost all their anterior permanent teeth erupted. Children with current or previous orthodontic treatment history were excluded at the beginning of the study.

The study was approved by the ethical committee of the College of Dentistry of Ajman University of Science and Technology. Informed consent from the children's parents was obtained before performing the dental check-up. The clinical examination was conducted at the diagnosis clinic of the College of Dentistry by one trained and calibrated orthodontics specialist using a tongue blade, a number of 5 plain mouth mirrors, and probe. No radiographs, study cast, or previously written records of the children were used. The IOTN was calculated from a direct examination. Malocclusion was determined using the IOTN. Two weeks after the initial examination, repeat examinations were carried out on approximately 10% of the sample to ensure the repeatability of the study (kappa 0.92).

Intraoral examination were conducted to register all the necessary malocclusion features to obtain the IOTN (over-jet, over-bite, anterior and posterior cross-bite, open-bite, impeded eruption, displacement of the teeth, hypodontia, molar relationship, cleft of lip, and/or palate), as well as personal details (name, age, and gender).

The AC of the IOTN was determined in a three-grade scale; with Grade 1 no esthetic need, through Grade 10, the great esthetic need for treatment.^[1] The subjects observed their teeth in the mirror, without cheek retractions, and compared them with one of the 10 photographs or levels of AC. The DHC of the IOTN on the five-grade scale; where Grades 1 and 2 represent no or slight need for treatment, Grade 3 borderline or moderate need for treatment, and Grades 4 and 5 require high priority for treatment.^[6]

Statistical analysis was undertaken using the Statistical Package for Social Sciences version 15.0 (SPSS Inc., Chicago, IL, USA). The data were entered through Microsoft Excel 2007 database. A Chi-square test was used to analyze the IOTN results by age and gender. Differences greater than $P < 0.05$ were considered as statistically significant.

RESULTS

A total of 300, 9- to 12-year-old children (mean age of 10 years, standard deviation: 0.85; Table 1) participated in this study. Of the 300 participants, 167 were female (55.7%) and 133 were males (44.3%).

Table 2 shows the age distribution of the participants, according to the AC and DHC. There was a statistically significant difference in both the IOTN AC ($\chi^2 = 18.1$; $P < 0.05$) and the IOTN DHC ($\chi^2 = 51.9$; $P < 0.05$).

Table 1: Age and gender distribution of the sample

Gender	n (%)	Mean age (SD)
Male	133 (44.3)	9.8 (0.80)
Female	167 (55.7)	10.2 (0.91)
Total	300 (100)	10.0 (0.85)

SD: Standard Deviation

Table 2: The distribution of the AC and DHC of the IOTN between 9 and 12 years of age

Category	n (%)			
	9 years	10 years	11 years	12 years
IOTN AC				
(1-4)	57 (61.3)	32 (48.5)	18 (42.9)	47 (47.5)
(5-7)	19 (20.4)	22 (33.3)	14 (33.3)	34 (34.3)
(8-10)	17 (18.3)	12 (18.2)	10 (23.8)	18 (18.2)
				($\chi^2=18.1$; $P<0.05$)
IOTN DHC				
(1-2)	46 (49.5)	36 (54.5)	21 (50.0)	37 (37.4)
(3)	31 (33.3)	21 (31.6)	17 (40.5)	32 (32.3)
(4-5)	16 (17.2)	9 (13.6)	4 (9.5)	30 (30.3)
				($\chi^2=51.9$; $P<0.05$)

IOTN: Index Orthodontic Treatment Need, AC: Aesthetic Component, DHC: Dental Health Component

Orthodontic treatment needs according to DHC is shown in Table 3. In 44.9% of the children, the treatment need was either slight or not indicated, 28.3% to borderline need, or 26.2% to a great need for orthodontic treatment. There was no statistical gender difference in the IOTN DHC grade ($\chi^2 = 1.85; P > 0.05$).

The grade distribution of the treatment needs using the AC; 48.7% of the children had no/little treatment need, 31.0% to borderline need, and 20.3% were considered to have a definite treatment need (Table 4). There was no statistical gender difference in the IOTN AC grade ($\chi^2 = 0.97; P > 0.05$).

The prevalence of individual malocclusal traits in all the participants is shown in Table 5.

Crowding of the teeth was the most frequent trait, which accounted for 38.3% of all individuals. Increased over jet was accounted for 32%. Cross-bite, impacted teeth, open-bite, accounted for 19%, 11.3%, and 9.3% of the individuals, respectively. Among others, 8.7% of the

participants had an overbite and 7.7% had reverse over jet, as well as 7.7 with hypodontia. Moreover, malocclusal traits such as submerged teeth, impeded eruption accounted for <2% of all participants while, cleft lip and palate were not found in any of the present study individuals.

DISCUSSION

The present investigation is the first study in the UAE of orthodontic treatment needed using the IOTN. Increasing international use of this index allows comparison of orthodontic treatment needed in UAE with other studies.

In term of the IOTN DHC, the 26.2% result of the children requiring orthodontic treatment is similar to the 25% scores found in Jordan.^[7] However, higher IOTN DHC scores of 27.3% were reported in Italy;^[8] 47.9% in Malaysia;^[9] 38.8% in Turkey;^[10] and 37% in Sweden.^[11]

With regards to IOTN AC, the result of 20.3% for the esthetic impact of malocclusion was very close to the 22.8% reported in Malaysia.^[9] However, most studies reported a lower orthodontic treatment need: 4.8% in Turkey;^[10] 7% in France;^[12] 3% in Jordan;^[7] and 3.2-8.6 in Italy.^[13] This difference might be attributed to the fact that the AC component is based on the response of the individual concerned, i.e. on how the malocclusion is self-perceived, through comparison with one of the IOTN AC photographs, which are arranged from most to the least attractive, whereas the DHC is an objective analysis of the occlusal characteristics of the dentition or it might be attributed to the impact of our sample selection because individuals contributed in this study came to the dental clinic seeking treatment at AUST, whereas the other samples were from school children. In agreement with most studies, no significant differences in orthodontic treatment need between males and females were observed.

In this study, the most common occlusal traits responsible for the final DHC components were crowding and increased over jet. Similarly, two studies conducted by Miguel *et al.*^[14] and Souames *et al.*^[12] recorded crowding as the most common trait, followed by increased over jet.

The present finding concerning orthodontic treatment need, according to IOTN, among this group of children are not representative of the totality of the population,

Table 3: Frequency of DHC of the IOTN by gender

Category	Grade	n (%)		
		Females	Males	Total
No/little	(1-2)	76 (45.5)	59 (44.3)	135 (44.9)
Borderline	(3)	48 (28.7)	41 (30.9)	84 (28.3)
Great need	(4-5)	43 (25.8)	33 (24.8)	81 (26.2)
Total		167 (100)	133 (100)	300 (100)

($\chi^2=1.85; P>0.05$), DHC: Dental Health Component, IOTN: Index Orthodontic Treatment Need

Table 4: Frequency of the AC of the IOTN by gender

Category	Grades	n (%)		
		Females	Males	Total
No/little	(1-4)	83 (49.7)	63 (47.4)	146 (48.7)
Borderline	(5-7)	48 (28.7)	45 (33.8)	93 (31.0)
Great need	(8-10)	36 (21.6)	25 (18.8)	61 (20.3)
Total		167 (100)	133 (100)	300 (100)

($\chi^2=0.97; P>0.05$), IOTN: Index Orthodontic Treatment Need, AC: Aesthetic Component

Table 5: Percentage score and number of individual malocclusal traits

Traits	n (%)
Crowding	115 (38.3)
Increased over jet	96 (32)
Crossbite	57 (19)
Impacted teeth	34 (11.3)
Openbite	28 (9.3)
Overbite	26 (8.7)
Reverse over jet	23 (7.7)
Hypodontia	23 (7.7)
Submerged teeth	5 (1.7)
Impeded eruption	4 (1.3)
Clift lip and/or palate	-

because their selection was based on a sample of attendees at the dental clinic in the college of dentistry at Ajman University of Science and Technology, Consequently, this sample may be different than other samples obtained from other countries where subjects are selected from schools.

CONCLUSION

The outcome of this study indicated that one-quarter of the contributed children are in need for orthodontic treatment, crowding and increased over jet were the most common occlusal features defining the DHC categorization. These finding would be useful for the public dental service to determine priority for orthodontic treatment. However, it is important to see if this result is applicable to the general population of children in the UAE.

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