

Original Article

The Relationship between Patient, Parent and Orthodontic Treatment Need and Demand in 17-Year-Old Students residing in Abade/Iran

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Abstract:

Objective: The planning of orthodontic treatment within a public health system requires information on the orthodontic treatment needs of the population. The aims of this study were to assess the student, parent and clinician normative need and demand for orthodontic treatment in a sample of Iranian students using the IOTN and to compare the treatment need levels according to sex and socio-economic status of the students and parents in urban and rural areas.

Material and Methods: A sample of 427, 17-year-old students was selected randomly from schools in Abade. A questionnaire of family socioeconomic status was proposed to the parents. All the students were examined according to the Aesthetic and Dental Health components (AC and DHC) of Index of Orthodontic Treatment Need. Students' and parents' perceived need was also assessed using AC.

Results: According to DHC classification, 18.7% of the students were in the "no need"; 35.6% in the "border line" and 45.7% in the "definite need" groups. The same categories for students assessed by the dentist were 66%, 30.2% and 3.7% respectively. AC assessment by students and parents entitled even more students in "no need" category. Sex and family income were the major factors in predicting orthodontic treatment demand ($P < 0.05$).

Conclusion: Orthodontic demand was highly related to the AC score and this component is of more value in predicting students demand instead of DHC.

Key Words: Health component, Aesthetic component, Index of orthodontic treatment need, Orthodontic demand

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INTRODUCTION

When we want to plan an orthodontic treatment program for a population, gathering the necessary information is inevitable [1]. This information allows us to choose patients based on financial, political or administrative purposes [2]. The gathered data lets us use indexes that quantify and summarize a set of

clinical data to obtain a final quantitative score or qualitative categorization [3,4]. In fact, the main goal of defining an orthodontic treatment need index is to know persons who have the priority and suitability for the treatment [5]. The Index of Orthodontic Treatment Need (IOTN), as defined by Brook and Shaw [6], has gained popularity in recent years because

of its validity, reliability and ease of use [7-10]. The IOTN has two parts: Aesthetic (AC) and Dental Health (DHC) components. The AC defines the perception of a person about the attractiveness of his/her dentition. It uses 10 photos with the first photo showing the most attractive and the 10th photo demonstrating the least attractive case [6-11]. The DHC assesses 10 traits of malocclusion: overjet, reverse overjet, overbite, openbite, crossbite, crowding, impeded eruption, defects of cleft lip and palate as well as any craniofacial anomaly, Class II and Class II buccal occlusions, and hypodontia. As stated by Shaw et al [3], Brook and Shaw [6] and So and Tang [7] the DHC shows the worst occlusal trait that is harmful to the dentition and its grades identifies the priorities in this regard. The index has also been modified to guarantee greater reliability, especially when used by non-specialists in oral health surveys [12]. Studies show that about one-third to half of young adult Asians need orthodontic treatment [13-16], but little information is available regarding this need in developing countries like Iran. The desire for orthodontic treatment is primarily influenced by demand and not always by need [17]. Few studies have been done regarding parents' concerns about orthodontic treatment need, while they are the main deciders in this field [18,19] and may have different opinions from their children [20]. It has also been reported that parents are the most powerful single factor in motivation for treatment [21]. Using a newly introduced Norwegian IOTN, Espeland et al [18] studied the orthodontic concern among potential patients and their parents. The investigations by Birkeland et al [19] also showed that parents are usually more concerned and eager about orthodontic treatment. The aim of this study was to assess the orthodontic treatment need by IOTN index and to analyze the data according to sex and socio-economic status of the students and parents in urban and rural areas. This study might also

show a need for the index modification, since the definition of treatment need is not universal. This is especially important when it comes to the Aesthetic part of the index. The perception of beauty is affected by training, cultural and ethnic factors [21-24].

MATERIALS AND METHODS

In total, 427 (211 male, 216 female) students aged 17 years were randomly selected in cluster sampling manner from 14 representative public schools in Abade (middle Iran, population 100000). Of all the cases 374 (87.6%) students were selected from urban and 53 (12.4%) from rural area during January to March 2005. The people are almost indigenous with low immigrants, have traditional culture and lower income comparing to five major cities of Iran (Tehran, Isfahan, Tabriz, Shiraz and Mashhad). The students were selected from a list obtained from the Directorate of Education in Abade health center. For the purpose of the study, the schools in the list were categorized according to the state, private or bright student schools. Two schools were also selected from rural areas. Students who had orthodontic treatment or were currently wearing an orthodontic appliance were not included in this study. All students were asked to produce birth certificates, Maternal and Child Health birth cards, or any other evidence for age verification.

Subsequently, parents of all the children participating in the study were asked to participate in the present study. It was also requested that wherever possible, mothers should accompany the students at the dental examination. If it was not possible for the mother or female guardian to accompany, then the father or male guardian was suggested as an alternative. Approval was obtained from ministry of education in Abade, the individual head of the schools and the parents and children were informed in writing, after which both could decide whether to participate in the study.

A questionnaire was given to the parents to refer to the demographic characteristics of the respondents. This form consists of place of living (rural or urban), parents' education status, occupation, working hours, time that parents dedicate to their children's education and finally family income.

Then a full clinical examination was carried out using a mouth mirror and a periodontal probe in Health Center dental office in natural daylight, followed by taking alginate impression for each student together with a wax bite which was poured the same day by a technician. Each malocclusion was also re-examined using the poured stone models. If the clinical and the model examinations did not match, the model examination was preferentially recorded. The examination was carried out by one author who had been previously trained and calibrated in the use of IOTN.

Each student's occlusion was assessed using the IOTN. The DHC of the IOTN records the various occlusal traits into five grades according to severity and the need for orthodontic treatment. Grade 1 and 2 represent 'no need for treatment', grade 3 'borderline' and grades 4 and 5 are considered to be a definite need for orthodontic treatment. The aesthetic component has a scale of 10 colored photographs showing different levels of dental attractiveness, with grade 1 representing the most attractive and grade 10 the least attractive. According to Richmond et al [25], grade 1-4 represent no or little need, grade 5-7 borderline need and grades 8-10 a definite need for orthodontic

treatment. A digital photograph of teeth when a lip retractor was applied was taken of each student and students' dental attractiveness was assessed by dentist, parents and students accordingly using 10 pictures of IOTN.

With patients and parents kept apart, the former were asked to choose the photograph they thought 'best looked like' their teeth from the AC of the IOTN [11]. Similarly, the parents were then asked to score the AC of the IOTN and perceived need for their child. All scoring was carried out blind and patients and parents were not allowed to see each other's scores. To evaluate the demand for orthodontic treatment, students and parents were asked verbally 'if it is necessary, would you like to have your teeth straightened'.

Reproducibility

Thirty of the children were re-examined 1 month after their initial examination. Kappa value for DHC and AC were 0.82 and 0.86, respectively, indicating good agreement [26].

Statistical analysis

Data were analyzed using Kruskal-Wallis and Mann-Whitney U test and ordinal regression and spearman's correlation coefficient were used for correlation and prediction assessment SPSS Ver. 11.5 software was used in this study.

RESULTS

Treatment Need: The survey revealed that 80 (18.7%) of the students had "no need" for orthodontic treatment with the DHC. One hundred and fifty two (35.6%) students had a bor-

Table 1. The relationship between patient- parent demand and AC component assessed by dentist

Demand		AC score			Total
		Definite need n (%)	Border line n (%)	No need n (%)	
Student's demand	No	236 (83.7%)	70 (54.3%)	1 (6.3%)	307 (71.9 %)
	Yes	46 (16.3%)	59 (45.7%)	15 (93.8%)	120 (28.1%)
	Total	282 (100%)	129 (100%)	16 (100%)	427 (100%)
Parent's demand	No	226 (80.1%)	62 (48.1%)	3 (18.8%)	291 (61.8%)
	Yes	56 (19.9%)	67 (51.9%)	13 (81.2%)	136 (31.9%)
	Total	282 (100%)	129 (100%)	16 (100%)	427 (100%)

derline need for orthodontic treatment with the DHC. The number of students with the definite need for orthodontic treatment was 195 (45.7%).

When AC of the IOTN was applied the results were dramatically different as the "no need" category (represents pictures 1 to 4) was 66 percent, the "border line" group (pictures 5-7) was 30.2 percent and the "definite" group (pictures 8-10) was 3.7 percent.

When the students were asked to assess their dental appearance to the AC of IOTN, 79.9 percent found themselves in "no need" category as 16.9 and 3.3 percent thought they best fit in "border line" or "definite need" categories respectively. The AC assessments of the students by their parents were a bit closer to the dentist ($P < 0.05$).

AC of IOTN assessed by the dentist showed a good relation to the patient and parents demand as it was 19.9, 51.9 and 81.3 percent for parents' demand as well as 16.3, 45.7 and 93.8 percent for students' demand respectively to the "no need", "moderate need" and "severe need" categories (Table 1).

Treatment Demand: When the students were proposed with the orthodontic treatment opportunity with an orthodontist, their demand for treatment was highly correlated to their perception of their teeth according to AC as 92.9 percent of the "definite need" students asked for that when the "border line" and "no need" group were 62.5 and 18.2 respectively (Table 2 and Table 3).

The "definite need" group in DHC scoring was not correlated to the students demand as only 36.9 percent of these students asked for ortho-

dontic treatment.

Although the parents were a bit pessimist about their children's dental appearance but the same result were found when orthodontic demand was proposed; their attitude toward treatment were highly correlated to the AC of the DHC but did not correlated to the DHC.

When the results were analyzed according to the students gender the AC of IOTN showed a significant different need between boys and girls assessed by parents, dentist and students. Although orthodontic treatment demand requested by parents was almost the same in either gender, female students had a higher demand for treatment comparing to the males (35.2% verses 20.9%).

DHC showed a significant difference in orthodontic treatment need between rural and urban students ($P = 0.048$).

AC of the IOTN failed to show a significant difference between rural and urban orthodontic need assessed by dentist, students and parents.

When the students were categorized according to the private or state schools they study, both DHC and AC revealed a better oral hygiene concern among private school students.

Orthodontic treatment demand was highly related to the family income ($P < 0.05$) as most of the low income parents and students denied to accept this treatment.

DISCUSSION

In the present study in Abade the population consisted of urban and rural areas which were mixed with the endogenous residents of the area, the gypsies, who are not very developed both socially and economically. Cultural gap

Table 2. The parents demand according to their AC assessment.

Demand	AC score			Total	
	Definite need n (%)	Border line n (%)	No need n (%)		
Parents' demand	No	291 (68.1%)	3(20.0%)	42 (41.6%)	246 (79.1%)
	Yes	136 (31.9%)	12(80.0%)	59 (58.4%)	65 (20.9%)
	Total	427 (100%)	15(100%)	101 (100%)	309 (100%)

between these people and the population in large cities is considerable. A large number of people do not believe in restoring primary teeth for their children, wrongly think it is not necessary, resulting in space loss and permanent teeth impeded eruption. First permanent molars are the major victims of extraction due to caries in adolescents in this area as most people mistakenly take them as primary teeth; resulting in hypodontia (the incidence of minor hypodontia as a result of first molar extraction was as high as 12.9%).

The study revealed that most of the people in small urban and rural areas in Abade had this old belief that they should, just like their parents, wear complete dentures in about their thirties or forties and were not very familiar with oral hygiene important role and the necessity of tooth restorations and conservation. State social programming for oral health is still in its infancy and people slowly are getting familiar to the advantages of such treatments.

Approximately half (45.7%) of 17 year old students in Abade were found in definite need of orthodontic treatment using the DHC. This estimate of 17 year old students in need of orthodontic treatment is higher than other figures reported by Holmes [27], Burden and Holmes [28] and Shaw et al [3] for British children, as well as Elham et al [29] for Jordanian children. Currently, there is one published research study about this issue in connection with the Iranian population Need (Shiraz 2007). Their study group consisted of 2000 school children in Shiraz, aged between 11 and 14 years. The result of this study showed that 7.63% students were in the category of no need, 45.1% in little

need, 25.8% in border line need, 12.72% in the severe and 5.69% were in the category of very severe need. [29] While the survey in Abadeh revealed that 18.7 percent of the students had "no need" for orthodontic treatment with the DHC and 35.6 percent had a borderline need for orthodontic treatment with the DHC [30]. The number of students with the definite need for orthodontic treatment was 195 (45.7%) which is more than 44.2% of the population and is still more than findings from the above study.

The difference between AC and DHC assessment was noticed by Hamdan [31] in Jordanian students and almost the same results was found here.

When AC was applied, two thirds of the students were categorized in "no need" group (66%) and 3.7 percent were in definite need, while parents and students were even more satisfied with the teeth appearance (72.8 and 79.9 percent thought they do not need orthodontic treatment). This could be justified by the early extraction of decayed teeth D, E and first molar in some occasions. A trend of serial extraction is well adopted among both people and regional dentists and dental hygienists in such districts. These customs of serial extraction besides the extraction of permanent canines in the occasion of lack of space result in reasonable aligned anterior teeth and a pleasant smile. Although such trend is not well documented in reference text books but the dentists in such areas try to get the best advantage of their knowledge and give their patients best aesthetic and hygienic dental care.

This study reveals that DHC of IOTN was not

Table 3. The students demand according to their AC assessment

Demand	AC score			Total	
	Definite need n (%)	Border line n (%)	No need n (%)		
Student's demand	No	1 (7.1%)	27 (37.5%)	279 (81.8%)	246 (79.1%)
	Yes	13 (92.9%)	45 (62.5%)	62 (18.2%)	65 (20.9%)
	Total	14 (100%)	82 (100%)	341 (100%)	309 (100%)

a good predictor for both students' and parents' concern about orthodontic treatment need. Most of the people in such areas do not search for dental care till they find their tooth badly damaged because of lack of knowledge and insufficient dental care. But surprisingly, they seem to be very cautious about their dental appearance and anterior teeth.

Of all 195 "definite need" students assessed by DHC only 36.9 percent were enthusiastic about orthodontic treatment while the parents were more cautious about the problem (40%), so the DHC is not a good predictor for orthodontic treatment demand in this group of students.

By contrast AC score was a precise predictor for orthodontic demand in "no need" category as almost all the students and their parents (97.5% and 93.8% respectively) think they have no demand for orthodontic treatment.

The relationship of DHC assessed by dentist and AC assessed by students was surprising. All the students that were categorized in "no need" by DHC, agreed to this (100%). But on the contrary, in the "definite need" group only 7.2 percent had the same belief. This is due to well aligned anterior teeth appearance of most of the children as a result of early extraction of permanent posterior teeth as stated before.

In present study the demand for orthodontic treatment was found to be 28.1 and 31.9 percent for parents and students, respectively. This was less than that reported by Holmes [32] for UK children. He found that 86 percent of the children examined were willing to accept orthodontic treatment. In Kenya and Hong Kong, Ng'ang'a et al [33] and Wang et al [34] reported less demand for orthodontic treatment, 33 and 40 percent, respectively.

As expected, differences in the need scores showed no differences between male and female samples which is in agreement with previous study [35-37].

Students' gender was a main factor in orthodontic demand as girls had twice as many re-

quests for orthodontic therapy as boys. So it shows that girls at the age of 17 are more concerned about their appearance and are more willing to accept such treatments even in low developed societies. This is also reported by Elham et al [29] and as Hedayati et al [30] Roberts et al [35] found that girls were more frequently treated than boys.

There was not a significant difference between rural and urban area residents regarding orthodontic treatment demand either by the students or the parents.

This study showed a significant difference between orthodontic treatment need and demand in the state and private school students, a factor that might manifest the family economic level. It also showed that family income was highly related to the orthodontic demand. This is explained by almost high private school fee that make it impossible for a low income family to afford. Orthodontic demand is related to family income as in both rural and urban areas, rich families were enthusiastic about this treatment because firstly they could afford it and secondly they were familiar with such treatments via television or satellite programs.

CONCLUSION

This study clarified that in spite of great need for orthodontic treatment according to the DHC of IOTN, orthodontic demand is highly related to the AC and the latter index should be considered in governmental dental health programs.

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