Research Article

Evaluation of relationship between orthodontic treatment need according Dental Aesthetic Index (DAI) and student's perception in 11-14 year old students in the city of Shiraz in 2012

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ABSTRACT

Background: Although the demand for orthodontic treatment is affected by understanding the needs for treatment and costs, patients' concerns do not always match with expert's assessments. To gain a clearer understanding of children's orthodontic needs, treatment recommendations and how an abnormality can affect a child's quality of life is critical. Information on the relationship between assessment of need for treatment and an individual's perception of need for orthodontic treatment is of great interest for orthodontic service providers. The present study aimed to assess the relationship between need for orthodontic treatment according to Dental Aesthetic Index (DAI) and individuals' perception of need for treatment in 11-14 year old students.
Methods: In this study, 240 primary and middle school students from the four educational districts of Shiraz were selected through multi-stage random sampling and completed the study questionnaire. Then dental examination was done by the dentist according to DAI index to determine the student's need for orthodontic treatment.
Results: According to the results, 73.8% of the students had DAI score of13-25 (little or no need for treatment), 15.2% had DAI score of 25-30 (specific malocclusion with elective need for treatment), 4.4% had DAI score of 30-35 (severe malocclusion with extreme need for treatment), and 6.7% had DAI score exceeding 35 indicating their serious need for orthodontic treatment. The total mean score of DAI was 23.57.
Conclusion: The results revealed a significant relationship between the students' perception of need for treatment and professional assessment of need for orthodontic treatment based on DAI index (P = 0.002).

Keywords: Treatment need, Orthodontic, Dental aesthetic index (DAI)

INTRODUCTION

Patients' feeling of need for treatment can create the potential for getting services. Since the problems resulting from oral and dental disorders have various effects on individuals' personal and social life, investigation of these outcomes through a patient-centered approach has attracted lots of attention.[1]

Although the demand for orthodontic treatment is affected by understanding the needs for treatment and costs, patients' concerns do not always match with experts' assessments. Studies have reported various degrees of correlation between patients' perception of need for treatment and treatment needs based on abnormalities. Yet, no study has reported the correlation to exceed 60%, and treatment need indexes normally

indicate higher need for treatment compared to the patients' perception of their needs. Differentiation between perceived needs and treatment needs has clear applications in getting dental services, because need for treatment is usually determined through clinical examination.

Considering the fact that malocclusion and oral abnormalities mainly affect beauty and performance, the major advantage of orthodontic treatment is improvement of the patients' oral and dental function eventually resulting in improvement of mental health and social welfare.[2] Therefore, paying attention to how a child feels about his/her appearance or oral and dental function is of great importance and must be considered as a priority in evaluation of need for orthodontic treatments.[3] In fact, the patients' attitude towards the treatment and their ability to cope with the resultant problems are among the most effective factors in the process of treatment.[4]

Considering what was mentioned above, obtaining a clearer understanding of children's need for orthodontic treatment, treatment recommendations, and how malocclusion can affect a child's quality of life is highly essential. In general, the relationship between evaluation of need for orthodontic treatment and an individual's perception of one's need for treatment has always been interesting to orthodontic service providers. Need for orthodontic treatment based on indexes has normally been higher compared to the individuals' perception of their treatment need.[5-8] Thus, need for treatment according to indexes is not necessarily the determinant of orthodontic treatment and an individual's perception of the dentofacial complex as well as psychological need for orthodontic treatment are of greater importance. Overall, treatment can be affected more by demand rather than need.[9]

In evidence-based dentistry, the question is whether subjective evaluation of need for orthodontic treatment is associated with the objective need in preadolescents.

Christopherson et al. assessed the need for orthodontic treatment in adolescents and revealed a relationship between the individuals' perceived need for treatment and treatment need based on indexes.[10] In another study entitled "Professional orthodontic treatment needs and individual's perception of need for treatment", need for orthodontic treatment and individuals' perception were found to be influenced by age, sex, race, and culture.[11] One other study showed that the relationship between objective and subjective need for treatment using IOTN index was similar in adults and children.[12]

Hence, nowadays researchers and clinicians mostly focus on the patients' views towards their oral health and try to plan their treatments based on clinical diagnosis as well as the patients' evaluation of their needs. This in turn results in higher patient satisfaction.

To date, various indexes are used to identify the need for orthodontic treatment each having advantages as well as disadvantages. Dental Aesthetic Index (DAI) is one of such indexes presented by World Health Organization in 1977 for determining the need for orthodontic treatments.[13] DAI is a simple, globally accepted index which is used in epidemiological studies to determine the individuals' need for treatment. It is also a tool for screening and determining the priority for treatment need and orthodontic care. The advantage of DAI index is that it gives aesthetic and physical dimensions of occlusion as a unit value, while other indexes require different evaluations for aesthetic, physical, and anatomical dimensions of malocclusion. Evidence has also shown that DAI is more widely used, it is easier to use, and consequently saves more time.[14] Standard DAI equat ion consists of 10 criteria or components measured for each occlusal morphology. These measures are then multiplied by their linear coefficients and summed up by a constant value, giving the final value of DAI (Table 1). DAI is a numerical index in which the evaluated occlusal characteristics are selected based on their potential for creation of a psychosocial and social disabilities.[15] According to DAI, an individual's occlusal status is categorized as normal occlusion or mild malocclusion, specific malocclusion with elective need for treatment, severe malocclusion or serious need for treatment, and disabling malocclusion. These categories are used by dental epidemiologists for assessment of need for orthodontic treatment in populations. They can also be used by health-financial managers for prioritizing orthodontic treatment. Therefore, the present study aims to determine the relationship between need for treatment based on DAI and individuals' perception of treatment needs in 10-14 year old students. The study results can thus be used by health planners for training experts and by insurance companies for allocating treatment budgets.

METHODS

After getting permission from the department of education, 240 primary and middle school students of the four educational districts of Shiraz who were between 10 and 14 years old were selected through simple random sampling. The inclusion criteria of the study were the students' consent for taking part in the study, not having undergone orthodontic treatment in the past, and not being under orthodontic treatment. The researchers performed the clinical examinations and completed the information form based on DAI. In addition, a questionnaire was used to record the students' demographic information and their views toward their dental appearance and need for treatment. This questionnaire was adopted from the questionnaire presented by Shue-TeYeh (2000) and Kerosuo (2004) and its reliability was confirmed by Cronbach's alpha of 0.78. In order to determine the questionnaire's validity, it was first translated into Persian. Then, it was back translated into English by another individual who was proficient in English language. Finally, the agreement

between the two versions was confirmed by the third specialist in English language. Also, the face validity of the questionnaire was approved by 10 experts.

Need for orthodontic treatment was assessed and recorded by a trained dentist using the 10 criteria of DAI based on WHO's principles (Table 1). The students were examined in a room with sufficient light using disposable gloves, tongue blade, and dental mirror .Calibrated probe made in the U.S. (Williams) was used, as well. After two weeks, 45 students were examined again by the same dentist and intra-examiner test was performed.

All the statistical analyses were performed using the SPSS statistical software. In order to describe the data, descriptive statistics including frequency distribution table, mean, standard deviation, and frequency percentage were used. Chi-square test, and T-test were used to analyze data. P <0.05 was considered as statistically significant.

RESULTS

The results of intra-examiner reliability test revealed 90.5% agreement between the first and second examinations. According to the results, 73.8% of the students had normal occlusion or little need for treatment (DAI=13-25), 15.2% had specific malocclusion with elective need for treatment (DAI=25-30), 4.4% had severe malocclusion with extreme need for treatment (DAI=30-35), and 6.7% had DAI scores exceeding 35 indicating their serious need for orthodontic treatment. The total mean score of DAI was 23.57. This mean score was 24.17 in boys and 22.97 in girls, but the difference was not statistically significant (P = 0.11).

Table 1: Percentage of need for orthodontic treatment based on DAI and students' feelings based on sex in 10-14 year old students, Shiraz.

Need for treatment	DAI	Whole sample	Boys	Girls	P value
Based on DAI	13-25	73.8	73.3	74.2	0.11
	26-30	15.2	14.2	15.5	
	31-35	4.4	4.2	5.3	
	>35	6.7	8.3	5	
Bases on individual feeling	Yes	47.9	48.3	47.5	0.89
	No	52.1	51.7	52.5	

Significance level: P <0.05

Considering the participants' perceptions, 47.9% of the students mentioned that they needed orthodontic treatment and 52.1% stated that they did not. The results revealed no significant difference between the two sexes in this regard (P = 0.89) (Table 1). Also, no significant difference was observed between the two sexes regarding the need for treatment based on DAI (P = 0.55). However, a significant relationship was found between

the students' perception of need for treatment and treatment need based on DAI (P = 0.002).

DISCUSSION

The present study aimed to investigate the relationship between need for orthodontic treatment based on DAI and individuals' perception in 10-14 year old students in Shiraz in 2012. According to the results, need for treatment based on DAI was 26.2% which is comparable to other studies conducted on the issue.[16,17] In addition, 73.8% of the students had no or little need for treatment, which is in agreement with the findings of the studies conducted by Momeni et al. in Shiraz (70.1%)[16] and Khaneh Masjedi et al. in Ahvaz (70.8%).[17] However, it is in contrast to the results of the study by Omidkhoda et al. which indicated that 40% of the 14-18 year old students in Shiraz needed orthodontic treatments.[18] This difference might be due to utilization of IOTN index in Omidkhoda's study or difference in the study population's age.[18] Moreover, the mean of need for orthodontic treatment based on DAI was 23.57 which is similar to the measures reported in Japan (25.3)[19] and Malaysia (24.6),[20] but lower than those reported in Spain (58.6)[21] and South Africa (47.7).[22] These results indicate that need for orthodontic treatment in Iran is lower compared to many other countries. This might result from racial variety and large immigrant populations in those countries. In our country, on other hand, the population is more homogeneous and the prevalence of malocclusion is lower, as mentioned by Khaneh Masjedi.[17]

The results of the current study revealed no relationship between DAI and sex, which is consistent with some other studies conducted in Iran,[16,17] Nigeria,[23] and South Africa. However, it is in contrast to the research conducted by Rashida in Malaysia reporting a significantly lower DAI in girls.[14] Nowadays, a large number of individuals undergo orthodontic treatments to improve their aesthetic-related psychosocial problems. Orthodontic treatment plans also consider aesthetic issues and appearance as a treatment goal.[24] The findings of the study by Rashida indicated a strong relationship between high DAI and lower satisfaction with dental appearance as well as lower social function.[14] Furthermore, recent studies have emphasized that severe abnormalities can be considered as a social disability, because well-set teeth and a beautiful smile can create self-confidence in social interactions, while crowded teeth can have negative impacts.[25,26]

According to the current study results, 73.8% of the participants did not need orthodontic treatment, while only 52.1% stated that they did not need the treatment. This implies that in spite of the fact that these individuals had no or little need for treatment, they were not satisfied with their dental appearance. The results of a Brazilian study showed that 87% of the children between 10 and 14 years old believed in their need for treatment, while professional evaluations showed only 52% to need

orthodontic treatment.[27] In the study conducted by Asgari et al. on 13-18 year old students in Isfahan in 2012 also, a significant difference was found between need for orthodontic treatment based on patient-centered versus professional diagnoses. In that study, 90% of the students believed that their teeth were healthy and normal, but only 50% of them did not have dental abnormalities.[28] Although using patient-centered indexes is essential for effectiveness and success of orthodontic treatments, it is accompanied by some complexities. In general, individuals' satisfaction with their teeth has its roots in psychosocial issues and also depends on the living environment; however, it is not highly associated with anatomical problems.[25] DAI does not include some abnormalities, such as depth of bite, appearance of gums, or high buccal canine. Patient satisfaction can also be affected by the view of oral soft tissue and position of jaws which are not taken into account in DAI. These might be the reasons for the observed contradictions which have also been mentioned in other studies.[21]

In the present study, 80.8% of the participants who had stated that they did not need orthodontic treatment were categorized as having little or no need for treatment, 14.2% had specific malocclusion with elective need for treatment, 3.4% were in the severe malocclusion group, and 1.6% were considered to have disabling malocclusion. The study results revealed a significant relationship between professional need for orthodontic treatment and the students' attitude toward treatment need (P = 0.002), which is consistent with the results obtained in similar studies conducted on the issue. For instance, Rashida carried out a research on 12-13 year old students in Malaysia in 2001 and reported a significant relationship between DAI and the participants' tendency toward orthodontic treatment. The results also indicated that the higher the DAI, the more the individuals' tendency toward treatment would be.[14] Similarly, Onyenson et al. performed a study to determine the relationship between DAI and students' perception of beauty, function, and speaking in Ibadan, Nigeria. They concluded that DAI was significantly associated with the students' perception of their dental appearance.[23] The study performed on Arab students in 2004 also demonstrated a significant relationship between individuals' perceived need for treatment and professional treatment need.[29] In the same line, Marques et al. conducted a study on 333 students between 14 and 15 years old and revealed a significant relationship between need for orthodontic treatment and individuals' view toward their treatment need.[27] Similar results were also obtained in the study of KhanehMasjedi performed on 11-14 year old students in Ahvaz.[17] Correspondingly, Matilda Mtaya et al. (2008) conducted a research on primary school students in Tanzania and indicated a significant association between individuals' perception of malocclusion and professional evaluation of need for orthodontic treatment (P <0.001). In that study, a large number of the children with the need for orthodontic treatment reported no psychosocial problems.[30] Likewise,

similar results were found in the study Christopherson et al. conducted on 8-11 year old children in 2009 (P <0.001).[10]

Nevertheless, Patricia F. Dias et al. compared need for treatment from Brazilian students' and their parents' viewpoints to professional treatment needs and came to the conclusion that professional needs were significantly higher than the children's perceived needs.[31] This difference is quite logical since factors, such as socio-economic status, cultural structure, individual health, and psychological characteristics, lead to different perceptions. Considering the fact that Iran is among the youngest countries of the world, it is necessary to perform epidemiological studies on jaw and dental abnormalities and need for treatment with respect to social health and health planning.

CONCLUSION

The mean of DAI in this study was lower compared to the studies conducted in other countries. Thus, Iranian students have better dental appearance and lesser need for orthodontic treatments. The results of the present study showed no significant difference between the two sexes regarding the mean of DAI (P = 0.118). Also, no significant difference was found between the two sexes concerning their attitude toward need for treatment (P = 0.89). However, a significant relationship was observed between professional need for treatment and individuals' perceived need for treatment (P = 0.002).

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