Psychological impact of Dental Aesthetics for Kurdish adolescents seeking orthodontic treatment

Fadil Abdulla Kareem[a], Trefa M. Ali Mahmood [b]

Abstract
Aim: the main goal of this study was to investigate the relationship between Kurdish orthodontic patients' severity of malocclusion and their social and psychological impact.
Materials and Methods: The sample consisted of 100 patients, 45 males and 55 females, aged 13–22 years. A translated pre-tested questionnaire [*Psychosocial Impact of Dental Aesthetics Questionnaire PIDAQ]* was used to assess the subjects' social and psychological impact by their occlusal irregularities; the actual severity of malocclusion was determined using the Dental Aesthetic Index (DAI) on 100 stone study models. Statistical analysis was carried out using chi-square test for assessing the associations, Spearman and Pearson correlation coefficients used for assessing correlations. Analysis of variance and multiple regression tests were also carried out to complete the statistical analysis.
Results: of the multiple regression analysis showed that not only DAI score were significantly associated with higher score of PIADQ but other factor like Gender was a significant variable in predicting the psychosocial impact of dental esthetics, while age was not significantly associated with PIADQ scores.
Conclusion: there was significant weak positive correlation between DAI score and PIADQ scale of the study sample at $p<0.005$.
Keywords: Psychological impact, Dental Aesthetics, Kurdish adolescents, orthodontic treatment

Malocclusion represents an important health problem worldwide.[1] Epidemiological surveys of malocclusion in several countries have reported that this oral disorder is highly prevalent.[2]

Department of Prevention ,Orthodontics and Pedodontics / College of dentistry /University of Sulaimani Kurdistan Region / Iraq

Corresponding author:

Malocclusion affects not only oral function and appearance, but it also has economic, social, and psychological effects.[3,4] Improvement of oral health and enhancement of psychosocial well-being are perceived benefits of orthodontic treatment.[3] Patients' expectations from orthodontics are primarily improvements in appearance, self-image and social functioning[5] This is supported by research on general body image which shows that individuals satisfied with their own physical appearance tend to be more outgoing and successful in social contact.[6] Orthodontists traditionally have considered oral health and function as the principal goals of treatment.[7,8] However;

recently there has been growing acceptance of aesthetics and its psychosocial impact as an important treatment benefit [9,10] Some patients report markedly improved body image and appearance-related self-confidence after orthodontic treatment [11] and good dental aesthetics and previous orthodontic treatment might have a beneficial influence on oral health-related attitudes and behavior of young adults. [12]
The general construct of quality of life originated in the field of general medicine and has been defined as "people's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns" [13] or, more simply, as "a sense of well-being that stems from satisfaction or dissatisfaction with areas of life that are important" to the individual.[14] The more specific concept of "oral health-related quality of life" has been defined as "a standard of health of oral and related tissues which enables an individual to eat, speak, and socialize without active disease, discomfort, or embarrassment" [15]or "The absence of negative impacts of oral conditions on social life and a positive sense of dentofacial self-confidence." [16]
Over the years, a variety of indices have been developed to assist professionals in categorizing malocclusion according to the level of treatment need: the Occlusal Index [17],the Handicapping Malocclusion Assessment record [18], and the Treatment Priority Index [19]. These indices were developed in the late 1960s and early 1970s, primarily for epidemiological purposes, but they have also been used to determine treatment priority. Demand for orthodontic treatment is mainly motivated by personal concerns about appearance and other psychosocial factors.[20,21] However; traditional methods of estimating orthodontic need or evaluating treatment outcome are mainly based on assessment of normative need and use, with occlusal indices or cephalometric measurements used to define need for or success/failure of treatment.[22,23] These measures reflect only the viewpoint of professionals, rather than consumer expectations. This is a serious shortcoming, because there are considerable differences between professional and patient perceptions of dental appearance and the need for orthodontic intervention. [22, 24, 25]
Traditional occlusal indices such as the Dental Aesthetic Index (DAI) and Index of Orthodontic Treatment Need (IOTN) evaluate the esthetic and anatomic components of malocclusion, [26] but they do not give any information about how malocclusion affects a patient's self-image and quality of life in terms of subjective well-being and daily functioning .27Recently there has been increasing interest in the incorporation of psychometric instruments that measure oral health–related quality-of-life (OHRQOL) outcomes [27,28] and assess body image perception 28 during the orthodontic treatment planning process. The usefulness of OHRQOL measures alongside normative indices in predicting orthodontic concerns has been investigated by several researchers. [21,24]
The use of sociodental indicators allow individuals with the greatest need to be a priority when financial resources are limited. [23,29] Moreover; efficient clinical management of orthodontic patients would predict their behavior and compliance during subsequent treatment, so that individuals with minor or borderline treatment needs can be safeguarded from the potential risks of unnecessary treatment.[21,23]
In persons with minor dental malocclusion, there is insufficient evidence that orthodontic treatment enhances dental health and function. Treatment is often justified by the potential enhancement of social and psychological well-being through improvements in appearance. [30] So the

purpose of this study was to find out the psycho-social impact of dental irregularities and malocclusion on Kurdish adolescents seeking orthodontic treatment.

Materail and Methods

One hundred cases were selected from patients attending orthodontic clinic (College of Dentistry/ University of Sulaimani), with different soci0-economic status, aged 13-22 (45 males and 55 females) with no prior orthodontic treatment asked to complete a translated form of the 'Psychosocial Impact of Dental Aesthetics Questionnaire' (PIDAQ) and 100 stone study models (upper and lower) were obtained to assess the dental aesthetics by using the Dental Aesthetic Index (DAI, table 1). Patients with any mental or behavioral disorders that may reduce their ability for self-determination were excluded as well as those who did not agree to participate.

Dental Aesthetic Index: The esthetic component of the DAI 31 includes 10 parameters of dentofacial anomalies related to both clinical and esthetic aspects of the anterior teeth (table 1).

Four grades of malocclusion are given, with priorities and orthodontic treatment recommendations assigned to each grade: grade 1 indicates normal or minor malocclusion/no treatment need or slight need (DAI ≤ 25); grade 2, definite malocclusion/treatment is elective (26 ≤ DAI ≤ 30); grade 3, severe malocclusion/treatment is highly desirable (31 ≤ DAI ≤ 35); and grade 4, very severe malocclusion/treatment is mandatory (DAI ≥ 36). The data were collected by a single examiner using periodontal probe with millimeter markings, millimeter ruler, calipers, pencil, and eraser. Each cast was examined and scored for the ten components of DAI. (Table 1)

Table 1: DAI components and rounded weight

DAI	Rounded weight
1.Number of missing visible teeth (incisors, canines, and premolars in maxillary and mandibular arch)	6
2. Crowding in incisal segment (0 = no segments crowded, 1 = 1 segment crowded, 2 = 2 segments crowded)	1
3.Spacing in incisal segment (0 = no spacing, 1 = 1 segment spaced, 2 = 2 segments spaced)	1
4. Midline diastema, in millimetres	3
5. Largest anterior maxillary irregularity, in millimetres	1
6. Largest anterior mandibular irregularity, in millimetres	1
7. Anterior maxillary overjet, in milimetres	2
8. Anterior mandibular overjet, in millimetres	4
9. Vertical anterior openbite, in millimetres	4
10. Anteroposterior molar relationship, largest deviation from normal either left or right (0 = normal, 1 = ½cusp mesial or distal, 2 = 1 full cusp or more mesial or distal)	3
11. Constant	13
Total	DAI score

Each component was then multiplied by its corresponding regression coefficient using the rounded weights. The products were then added and summed with the regression constant to give the DAI score.

Psychosocial Impact of Dental Aesthetics Questionnaire The PIDAQ 32 is a 23-item psychometric instrument for assessment of orthodontic-specific aspects of quality of life, expressed in four domains: dental self-confidence (six items), social impact (eight items), psychological impact (six items), and esthetic concern (three items).

The PIDAQ instrument had been previously tested for its validity, reliability, and factorial stability across samples. 32 The subjects were asked to rate how much dental esthetics exerted a positive or negative impact using a five-point Likert scale ranging from 0 to 4 (0 indicates not at all; 1, a little; 2, somewhat; 3, strongly; and 4, very strongly). An overall PIDAQ score was obtained by summing all item scores.

Statistical Analysis: Descriptive statistics of clinical characteristics and scores were obtained. Chi-square test was used to reveal the association of DAI with age, gender and PIDAQ, further more Spearman and Pearson correlation coefficient and Multiple linear regression analysis were used to test the influence of DAI scores, age and gender on the PIDAQ scale. The significance level was set at $P < 0.05$. SPSS 14.0 for Windows was used for statistical analysis.

Results

Table 2 shows age and gender distribution of the study sample, as it is clear that most of patients seeking orthodontic treatment between 19-22 years of age which was about 43% of total sample size and most of them are females (55%). Table 3 explains the DAI scores, frequencies and percentages of the sample. Table 4 and 5 explain the non significant association of DAI score with gender and age group using chi square test (at P value = 0.328 and 0.372 respectively), while table 6 reveals the significant association of DAI score with PIDAQ scale using Pearson chi-square(χ^2= 192.32). Thus, there is a significant Correlation between DAI score and PIDAQ at $p<0.005$. Table 7 and 8 explain the significant Correlation of DAI score with PIADQ and gender at the 0.01 level (2-tailed) using both Pearson and Spearman`s correlations . Finally table 9, shows the results of the multiple regression analysis that not only DAI score were significantly associated with higher score of PIADQ scores but the gender also play an important role whereas other factors such as age was not significantly associated with PIADQ scale.

Table 2: Age and gender distribution of the study sample

		Frequency	Percent
Age group	13-15	39	39
	16-18	18	18
	19-22	43	43
	Total	100	100
Gender	Male	45	45
	Female	55	55
	Total	100	100

Table 3: DAI score of the study sample.

		Frequency	Percent
DAI score	1	46	46
	2	29	29
	3	10	10
	4	15	15
	Total	100	100

Table 4: Association of DAI score and gender

Table 5: Association of DAI score and age group

DAI score	Age group			Total	χ^2	P value
	13-15	16-18	19-22			
≤25	22	7	17	46		
	47.82%	15.21%	36.95%	100%		
26-30	9	5	15	29		
	31.03%	17.24%	51.72%	100%	6.468861	0.372764
30-36	3	4	3	10		NS
	30%	40%	30%	100%		
≥ 36	5	2	8	15		
	33.33%	13.33%	53.33%	100		
Total	39	18	43	100		
	39	18	43	100		

Table 6: Association of DAI score and PIDAQ

	χ^2	df	P value
Pearson Chi-Square	192.32	78	0.000
Likelihood Ratio	178.0	78	0.000
N of Cases	100		

Table 7: Pearson correlation of DAI with PIADQ , Gender and Age.

Correlations					
		DAI number	**PIADQ**	**GENDERNU**	**age**
DAI number	**Pearson Correlation**	1	0.403	-0.206	0.207
	Sig. (2-tailed)		0.000	0.039	0.038
	N	100	100	100	100
**	Correlation is significant at the 0.01 level (2-tailed).				
*	Correlation is significant at the 0.05 level (2-tailed).				

Table 8: Spearman`s correlation of DAI with PIADQ , Gender and Age.

Correlations						
			DAI number	**PIADQ**	**GENDERNU**	**age**
Spearman's rho	**DAI number**	**Correlation Coefficient**	1	0.375	-0.21	0.156
		Sig. (2-tailed)		0.000	0.034	0.11
		N	100	100	100	100
**	Correlation is significant at the 0.01 level (2-tailed).					
*	Correlation is significant at the 0.05 level (2-tailed).					

Table 9: Multiple regression analysis of PIADQ scores (as a dependent variable) and several co-variates (n=3)

	Unstandardized Coefficients		**Standardized Coefficients**	**t**	**Sig.**
	B	**Std. Error**	**Beta**		
(Constant)	5.422	6.754		0.802	0.424
DAI score	0.526	0.109	0.454	4.824	0.000
Age	0.000	0.313	0.000	0.000	1.000
Gender	5.999	2.23	0.24	2.681	0.008
a. Dependent Variable: PIADQ					

Discussion

The oral-facial region is usually an area of significant concern for the individual because it draws the most attention from other people in interpersonal interactions and is the primary source of vocal, physical, and emotional communication. As a result, patients who seek orthodontic treatment are concerned with improving their appearance and social acceptance, often more than they are with improving their oral function or health. Enhancing these aspects of quality of life is an important motive for undergoing orthodontic treatment. Over the past decade, the impact of oral health and disease, dental appearance, malocclusion, and treatment for these conditions on psychological and functional well-being has drawn increasing attention from clinicians and researchers. Indeed, a recent issue of Seminars in Orthodontics was dedicated to the topic of quality of care and quality of life associated with malocclusion and its treatment. [33]

Unlike the Index of Orthodontic Treatment Need (IOTN), DAI attempts to incorporate patients' perceptions into the index and it links the clinical and aesthetic components mathematically to produce a single score that combines the physical and aesthetic aspects of occlusion. [34] The DAI appears to be easy to use, although the lack of assessment of traits such as buccal cross bite, open bite, centerline discrepancy and deep overbite is a limitation of this index. [35]

On the other hand, PIDAQ appears to meet the criteria of a good instrument as manifested in factorial stability across the samples, in consistency of scales, and in criterion-related validity. It may be helpful in distinguishing between various patient and provider perspectives and values, and serve as means of documenting the benefits of orthodontic treatment in health policy discussions.[36]

Our study revealed that subjects' perception scores of the PIDAQ scale were analyzed according to the grades of malocclusion determined by the DAI. Overall, scores on the PIDAQ scale were higher with a greater DAI score ($P < 0.001$), so patients with higher DAI scores had greater esthetic impact scores, and those with less attractive dentitions may be psychosocially disadvantaged and have esthetic concerns. Mandall et al 37 found that children with higher orthodontic treatment need perceived more negative psychosocial impacts. Al-Sarheed et al 38 showed that 11- to 14-year-old individuals with malocclusion reported significantly more impact and hence a worse quality of life compared with a group of individuals with no or minimal malocclusion. Although dissatisfaction with dental appearance is broadly related to the severity of irregularities, there are differences in the recognition and evaluation of them. It is not uncommon to observe that some patients with severe malocclusions are satisfied with or indifferent to their dental esthetics, while others are very concerned about minor irregularities.[39]

These results confirm the view that adolescents attribute high importance to an attractive dental appearance.[20,25,40] Grzywacz 40 reported that 100% of 84 children aged 12 years judged that healthy and well arranged teeth were important in facial appearance. Van der Geld et al [41] found that facial attractiveness was correlated with personality traits and self-confidence/ self-esteem and highlighted the need for further study on the esthetic aspects of the oral region within the whole scope of facial esthetics and within the context of acceptance of one's own body. Phillips and Beal 39 showed that, in adolescents, the self-perceived level of the attractiveness or "positive" feelings toward the dentofacial region is a more important factor in one's self-concept than the severity or perceived severity of the malocclusion or the adolescent's perception of their

malocclusion. In general, the impact of oral health conditions on quality of life, especially in items of satisfaction with appearance, may result in feelings of shame in social contacts and those who are psychosocially disadvantaged.[25, 29, 39] Therefore, the expected benefits of orthodontic treatment would include an enhancement of self-esteem and a reduction in social anxiety.[22, 25]

Gender has a significant variable in predicting the psychosocial impact of dental esthetics, and this come in accordance with other studies that found, women are more critical of their perception of impacts related to dental esthetics. [23,42] This might be a result of the commonly reported greater concern about health in women than in men, as expressed by higher attention to health care and greater awareness of oral health impacts, attractiveness of facial appearance, and quality-of-life considerations[23], on the other hand Delcides [42] revealed that Gender was not an important variable but they incorporate other variables as Self-Image, Subjective self-perception of dental esthetics in adolescents is influenced by occlusal conditions, oral health–related quality of life, and self-image. Together, these measures can provide a good indication of treatment need. Other studied like Nihal et al [43] reveal a significant negative, but weak correlations were found between Turkish university students' awareness of malocclusion and satisfaction with personal dental appearance at the various severity levels of malocclusion. The findings of this study showed that age had a significant effect on satisfaction and gender on DAI score variation. Whereas Patients with malocclusion, especially those in need of surgical correction, have lower health related quality of life (HRQOL) and higher anxiety since Azuma et al [44] investigated the changes of HRQOL and psychological status following jaw surgery in the patients with facial deformities. Finally Badran [45] found a week correlation but dissatisfaction with dental appearance had a strong predictive effect on self-esteem. Because patients' perceptions of psychosocial impact related to dental esthetics are multifactorial and are influenced by measures of normative orthodontic treatment need as well as subjective aspects, a multifactorial approach may also be useful in planning orthodontic services and in guiding public health practices. It may also minimize the risks of over treatment and reduce costs by identifying those with a greater likelihood of benefiting from orthodontic treatment. Additional studies are needed to assess the predictive value of other clinical and socio-dental variables on perceived esthetic impacts in adolescents, focusing on representative samples of normal populations. The specific socio-demographic characteristics of this convenience sample may have resulted in potential bias when clinical and epidemiologic inferences are considered.At last, we think that the existence of an authorized program for treatment of malocclusion for adolescents in schools by the Ministry of Health in our region will induce a great impact in this field. It deserves to flash that the highly cost of orthodontic treatment is one of the major causes of rejection of orthodontic treatment.

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