

Association of orthodontic treatment needs and oral health-related quality of life in young adults

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Introduction: Our objective was to assess the effect of different orthodontic treatment needs on the oral health-related quality of life of young adults. **Methods:** The study sample comprised 366 young adult orthodontic patients (153 men, 213 women; age range, 21-25 years). Each participant was assessed for orthodontic treatment need and oral health-related quality of life by using the dental health component of orthodontic treatment need index and the shortened version of oral health impact profile questionnaire. **Results:** Orthodontic patients who had little or no, borderline, and actual need for orthodontic treatment represented 14.8%, 56%, and 29.2% of the total sample, respectively. Orthodontic treatment need significantly affected mouth aching, self-consciousness, tension, embarrassment, irritability, and life satisfaction in both sexes. Also, orthodontic treatment need significantly affected taste and relaxation in both men and women. However, pronunciation and the ability to do jobs or function effectively were not significantly associated with orthodontic treatment needs in either sex. **Conclusions:** These findings emphasize the impact of malocclusion on oral health-related quality of life of young adults. (*Am J Orthod Dentofacial Orthop* 2010;137:42-7)

Traditionally, clinician-based outcome measures were more important for dental researchers than subjective patient-based measures such as perceived functional status and psychological well-being.¹ However, patients and dentists differ in their evaluation of oral health and the perception of oral diseases.^{2,3} Recently, researchers and clinicians have focused more on patients' own perceptions of oral health status and oral health care systems to understand their needs, satisfaction with treatment, and ultimately the perceived overall quality of health systems.^{4,5}

Oral diseases, including malocclusion, are highly prevalent, and the consequences are physical, economical, social, and psychological.⁴ They can impair the quality of life in many people and affect various aspects of life, including function, appearance, and interpersonal relationships.⁶ Therefore, considering the oral cavity as an autonomous landmark is now being questioned and more emphasis is placed on how the oral

conditions affect health, well-being, and quality of life.¹ According to the concept of oral health-related quality of life (OHRQOL), good oral health is no longer seen as the mere absence of oral diseases and dysfunction. OHRQOL encompasses the absence of negative impacts of oral conditions on social life and a positive sense of dentofacial self-confidence.⁷

Understanding the physical, social, and psychological impact of malocclusion on OHRQOL needs more attention, since it sheds light on the effects of malocclusion on people's lives and provides more understanding of the demand for orthodontic treatment beyond clinician parameters.⁸ In addition, since social and psychological effects are the key motives for seeking orthodontic treatment, OHRQOL can be considered the best measurement for orthodontic treatment need and outcome.⁹ Therefore, OHRQOL measurement is recommended for orthodontists to supplement clinical findings, since OHRQOL outcome does not necessarily correlate with such objective findings.⁴

Several indexes were used to evaluate malocclusion. The index of orthodontic treatment need (IOTN) is a scoring system for malocclusion, developed by Brook and Shaw.¹⁰ It includes 2 independent components: the dental health component (DHC), a 5-grade index that records the dental health need for orthodontic treatment, and the esthetic component that records the esthetic need for orthodontic treatment.^{2,7,8} The IOTN has been used extensively in the literature to evaluate actual and perceptible orthodontic treatment needs.¹⁰⁻¹⁴ The DHC grades patients' treatment needs either as no

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treatment need, little treatment need, borderline need, or treatment required.

The oral health impact profile (OHIP) is an extensively used instrument for the assessment of OHRQOL.^{15,16} The original version of the scale includes 49 items divided into 7 domains. A short form of the OHIP containing only 14 items (OHIP-14) has been developed.¹⁷ The OHIP is designed to determine the perception of the social impact of oral disorders and has well-documented psychometric properties.^{15,18}

The aim of this study was to assess the effect of different orthodontic treatment needs on the OHRQOL of young adults.

MATERIAL AND METHODS

A cross-sectional study was conducted of orthodontic patients to assess the relationship between orthodontic treatment needs assessed by the DHC of the IOTN and OHRQOL assessed by the OHIP-14 questionnaire.¹⁷

A consecutive sample of young adults seeking orthodontic treatment at the Faculty of Dentistry, King Abdulaziz University, were recruited in the study according to the order of registration on the waiting list. Patients who had a perceived need for orthodontic treatment and who were about to undergo orthodontic therapy were included. Exclusion criteria were chronic medical conditions, previous orthodontic treatment, craniofacial anomalies such as cleft lip and palate, untreated dental caries, and poor periodontal health status as indicated by a community periodontal index score of 3 or more.¹⁹ This was to prevent possible confounding effects of these conditions on the participants' quality of life. After screening, the sample comprised 366 orthodontic patients (153 men, 213 women) from 21 to 25 years of age who were willing to participate in the study.

Ethical approval was obtained at the beginning of the study. The participants were informed about the examination procedures and were assured of the confidentiality of the collected information. Only those who gave consent were included in the research.

Each patient was examined for orthodontic treatment need with the DHC of the IOTN. Examiners were calibrated to use it (κ , 8.5). Treatment needs of the patients were categorized as (1) little or no treatment need, (2) borderline need, and (3) treatment required. The DHC uses a simple ruler and an acronym—MOCDO (missing teeth, overjet, crossbite, displacements of contact points, overbite)—to identify the most severe occlusal trait for each patient. The final overall score was given to the patient according to the most severe trait.¹⁰

The data collection instrument for assessment of OHRQOL was the OHIP-14 questionnaire.¹⁷ The questionnaires were administered by the examiners before the clinical examination. Each patient was asked about the frequency that he or she experienced an impact on 14 daily activities. Responses were made on a 5-point Likert-type scale (never, hardly ever, occasionally, fairly often, and very often). A threshold of occasionally, fairly often, and very often was used to dichotomize responses, thereby indicating participants who had experienced at least some oral health impact.

The daily activities were the following: had problems pronouncing words, felt that the sense of taste worsened, had painful aching in the mouth, found it uncomfortable to eat any food, have been self-conscious, felt tense, had an unsatisfactory diet, had to interrupt meals, found it difficult to relax, have been a bit embarrassed, have been irritable with other people, had difficulty doing useful jobs, felt that life in general was less satisfactory, and have been totally unable to function.

Statistical analysis

Data presentation and statistical analysis were performed with the SPSS statistical package (version 13, SPSS, Chicago, Ill). The chi-square test was used to analyze the qualitative data. The level of significance was 0.05.

RESULTS

Table I shows that men and women were 41.8% and 58.2% of our sample, respectively. The mean age of the total sample was 23 years. In this study, patients who had little or no, borderline, and need for orthodontic treatment were 14.8%, 56%, and 29.2%, respectively. The corresponding percentages were 13.7%, 54.2%, and 32.1% in the men and 15.5%, 57.3%, and 27.2% in the women, respectively.

In Table II, the chi-square test shows that pronunciation was not significantly affected by the need for orthodontic treatment in either men ($\chi^2 = 2.6$; $P = 0.2$) or women ($\chi^2 = 1.11$; $P = 0.5$). Taste, however, was significantly affected by the level of orthodontic treatment need in men ($\chi^2 = 6.9$; $P = 0.03$) but not in women ($\chi^2 = 5.6$; $P = 0.06$).

Among the examined subjects, the proportions of orthodontic patients who found it uncomfortable to eat any food, had an unsatisfactory diet, and had to interrupt their meals were significantly correlated with orthodontic treatment needs in both men ($\chi^2 = 11.9, 9.6,$ and 7.9 ; $P = 0.003, 0.008,$ and $0.01,$ respectively) and women ($\chi^2 = 7.8, 13.9, 11.3$; $P = 0.02, 0.00,$ and $0.00,$

Table I. Characteristics and orthodontic treatment need of the study sample

Sample characteristics	Men	Women	All combined
Number (%)	153 (41.8%)	213 (58.2%)	366 (100%)
Age (y)			
Mean	24.08	22.27	23
SD	1.16	1.44	1.6
Treatment need			
No or little need (%)	21 (13.7%)	33 (15.5%)	54 (14.8%)
Borderline (%)	83 (54.2%)	122 (57.3%)	205 (56%)
Need (%)	49 (32.1%)	58 (27.2%)	107 (29.2%)

respectively). Also, in both male and female patients, the need for orthodontic treatment significantly affected painful mouth aching ($\chi^2 = 10.2$ and 10.9 ; $P = 0.006$ and 0.00 , respectively), self-consciousness ($\chi^2 = 16.4$ and 17.8 ; $P = 0.00$), and feelings of tension ($\chi^2 = 12.8$ and 9.9 ; $P = 0.00$). Relaxation was also significantly associated with the level of orthodontic treatment need in women ($\chi^2 = 6.8$; $P = 0.03$), but it did not reach the level of significance in men ($\chi^2 = 3.5$; $P = 0.17$).

Moreover, embarrassment, irritability with other people, and the general feeling of less satisfaction in life were significantly associated with higher orthodontic treatment needs in both men ($\chi^2 = 11.3$, 16.7 , and 12.5 ; $P = 0.003$, 0.00 , and 0.00) and women ($\chi^2 = 10.1$, 18.5 , and 14.2 ; $P = 0.00$, 0.01 , and 0.00). On the other hand, orthodontic treatment needs did not significantly affect the ability of the patients to do their jobs or function effectively ($\chi^2 = 3.8$ and 2.07 ; $P = 0.15$ and 0.35 in men; $\chi^2 = 2.9$ and 1.49 ; $P = 0.23$ and 0.40 in women, respectively).

DISCUSSION

Clinicians are increasingly placing more emphasis on patient-based evaluations of health-related quality of life.²⁰ This might be particularly important in cosmetic and elective treatments.²¹ Although it is generally accepted that malocclusion has physical and psychological consequences, there is still conflicting evidence about the extent of these effects. This could be due to the different interpretations of what these impacts constitute and the lack of standardized approaches for assessment. Therefore, this study was conducted to assess the impact of orthodontic treatment needs on OHRQOL in orthodontic patients.

The OHIP questionnaire that we used has been utilized in general populations and patients with certain oral disorders.²² More specifically, this questionnaire was used in assessing the impact of malocclusion on quality of life in several studies.^{16,17} The sensitivity

and specificity of this questionnaire have been evaluated in both cross-sectional and longitudinal studies.^{18,23} Additionally, the Arabic version of OHIP was recently tested in a convenience sample of Saudi people. Its responsiveness, reliability, and high internal consistency were confirmed.²⁴ Similarly, the IOTN was previously used in Saudi orthodontic patients.¹⁴

In this study, adolescent orthodontic patients were not included because major life changes during adolescence affect their quality of life and make it difficult to identify which daily activities are changed solely by the need for orthodontic treatment.⁹ Thus, this study was confined to young adults, whose major life changes have subsided.

Because quality of life is a relative rather than an absolute measure, these results were expressed as a comparison of the impacts on daily activities between orthodontic patients with different orthodontic treatment needs.²⁵ Unexpectedly, women had nearly similar impacts of orthodontic treatment needs on their daily activities as did the male orthodontic patients. This was in contradiction with the study of de Oliveria and Sheiham,⁹ who reported that sex significantly affects the impact of malocclusion on OHRQOL, and women were 1.22 times more likely to have an impact than men.

Our results showed that orthodontic treatment needs did not significantly affect speech and word pronunciation. This confirmed the results of a previous study that found no association between speech problems and malocclusion.²⁶ The nonassociation between orthodontic treatment need and pronunciation can be explained, since speech is a complex process that involves brain, teeth, lips, tongue, and muscles that can compensate mutually to ensure perceptually normal pronunciation.¹⁶ Other researchers, however, observed a strong association between speech disorders and dentofacial abnormalities.²⁶⁻²⁸

However, in this study, taste, chewing ability, diet selection, and meal interruption were significantly affected by the orthodontic treatment needs of the examined subjects. This confirmed other cross-sectional studies reporting that subjects with malocclusion have less masticatory efficiency compared with those with normal occlusion, suggesting that malocclusion can affect diet in terms of taste and ability to chew.²⁹⁻³² On the other hand, Daniels and Richmond³³ reported that technical aspects of malocclusion such as dissatisfaction with the ability to chew are less likely to impact the quality of life among young adults as more subjective aspects of dental esthetic and self-perception of dental appearance.

Also, the significant association between orthodontic treatment needs and oral pain observed in this study agreed with previous studies reporting that

Table II. Impacts on daily activities in relation to sex and orthodontic treatment needs

OHIP-14 Daily activity	Orthodontic treatment need						χ^2 P	
	No or little treatment need		Borderline treatment need		Treatment need		Male	Female
	Males 21	Females 33	Males 83	Females 122	Males 49	Female 58		
Had problem pronouncing words								
Impact: n (%)	8 (38)	15 (45)	43 (52)	65 (53)	29 (59)	33 (57)	2.6	1.11
No impact: n (%)	13 (62)	18 (56)	40 (48)	57 (47)	20 (41)	25(43)	0.2	0.5
Felt sense of taste worsened								
Impact: n (%)	9 (43)	11 (33)	52 (63)	69 (57)	37 (76)	31 (53)	6.9	5.6
No impact: n (%)	12 (57)	22 (67)	31 (37)	53 (43)	12 (24)	27 (47)	.03*	0.06
Had painful aching in mouth								
Impact: n (%)	8 (38)	9 (27)	55 (66)	70 (57)	38 (78)	35 (60)	10.2	10.9
No impact: n (%)	13 (62)	24 (73)	28 (34)	52 (43)	11 (22)	23 (40)	.006*	.00*
Found it uncomfortable to eat food								
Impact: n (%)	5 (24)	14 (42)	50 (60)	80 (66)	33 (67)	41 (71)	11.9	7.8
No impact: n (%)	16 (76)	19 (58)	33 (40)	42 (34)	16 (33)	17 (29)	.003*	.02*
Have been self-conscious								
Impact: n (%)	7 (33)	10 (30)	59 (71)	81 (66)	40 (82)	42 (72)	16.4	17.8
No impact: n (%)	14 (67)	23 (70)	24 (29)	41 (34)	9 (18)	16 (28)	.00*	.00*
Felt tense								
Impact: n (%)	6 (29)	11 (33)	53 (64)	68 (56)	36 (74)	39 (67)	12.8	9.8
No impact: n (%)	15 (71)	22 (67)	30 (36)	54 (44)	13 (26)	19 (33)	.00*	.00*
Had an unsatisfactory diet								
Impact: n (%)	8 (38)	10 (30)	57 (69)	79 (65)	37 (76)	38 (66)	9.6	13.9
No impact: n (%)	13 (62)	23 (70)	26 (31)	43 (35)	12 (24)	20 (34)	.008*	.00*
Had to interrupt meals								
Impact: n (%)	9 (43)	12 (36)	53 (64)	71 (58)	38 (78)	42 (72)	7.9	11.3
No impact: n (%)	12 (57)	21 (64)	30 (36)	51 (42)	11 (22)	16(28)	0.01*	.00*
Found it difficult to relax								
Impact: n (%)	7 (33)	13 (41)	46 (55)	71 (58)	27 (55)	40 (69)	3.5	6.8
No impact: n (%)	14 (67)	20 (59)	37 (45)	51 (42)	22 (45)	18(31)	0.17	.03*
Have been a bit embarrassed								
Impact: n (%)	8 (38)	12 (36)	53 (64)	70 (57)	39 (80)	41 (71)	11.3	10.1
No impact: n (%)	13 (62)	21 (64)	30 (36)	52 (43)	10 (20)	17 (29)	.003*	.00*
Have been irritable with people								
Impact: n (%)	6 (29)	13 (39)	58 (70)	71 (58)	38 (78)	41 (71)	16.7	8.5
No impact: n (%)	15 (71)	20 (61)	25 (30)	51 (42)	11 (22)	17 (29)	0.00*	.01*
Had difficulty doing useful jobs								
Impact: n (%)	8 (38)	13 (39)	45 (54)	68 (56)	31 (63)	32 (55)	3.8	2.9
No impact: n (%)	13 (62)	20 (61)	38 (46)	54 (44)	18 (37)	26 (45)	0.15	0.23
Felt life in general less satisfactory								
Impact: n (%)	6 (29)	10 (30)	55 (66)	72 (59)	35 (71)	41 (71)	12.5	14.2
No impact: n (%)	15 (71)	23 (70)	28 (34)	50 (41)	14 (29)	17 (29)	0.00*	.00*
Have been unable to function								
Impact: n (%)	9 (43)	18 (55)	49 (59)	78 (64)	25 (51)	39 (67)	2.07	1.49
No impact: n (%)	12 (57)	15 (45)	34 (41)	44 (36)	24 (49)	19 (33)	0.35	0.4

*Significant at 5% level; df = 2.

malocclusion can cause pain indirectly by leading to temporomandibular disorders^{34,35} or increasing the likelihood of trauma to proclined maxillary incisors.³⁶ Additionally, retroclined maxillary incisors cause direct trauma to the labial gingiva of the mandibular incisors with associated pain.³⁷

In this study, embarrassment and self-consciousness, as a person's intentional focus on his or her internal

sensations, were significantly correlated to orthodontic treatment needs. This agrees with Klages et al,³⁸ who found that young adults with more severe forms of malocclusion had higher self-consciousness scores. Also, these results paralleled the observation of Dion et al³⁹ that self-consciousness is significantly affected by orthodontic status. Moreover, our results coincided with several studies that reported that most patients who

need orthodontic therapy feel shameful and inferior, and the higher the need for treatment, the greater the person's embarrassment.^{40,41} Helm et al⁴² reported that the self-consciousness and embarrassment felt by orthodontic patients are not only displayed in adolescence, but also persist in adulthood. Other studies, however, reported nonsignificant associations between malocclusion and self-consciousness or embarrassment.^{43,44}

Some cross-sectional and retrospective studies confirmed our observation that young adults with higher treatment needs tended to be more socially deprived than those with lower treatment needs.^{40,44} Ironically, dental deformity elicits strong emotional reactions leading to psychosocial problems including isolation and depression.⁴⁵ Additionally, facial appearance and the geometric features of the face could, to a large extent, influence social activities and the success of interpersonal relationships.⁴⁶ Therefore, we found it not surprising that orthodontic patients with clinically assessed greater orthodontic needs reported more embarrassment and irritability with other people than those with no or borderline orthodontic treatment needs.

These results support the assumption that orthodontic patients mainly suffer esthetic and social problems rather than impairment of daily activities.⁹ This was shown by the nonsignificant association between orthodontic treatment needs and orthodontic patients' ability to function and do their jobs. These results agree with those of Albino et al,⁴⁷ who reported that about 80% of orthodontic patients complain about esthetic rather than health and functional impacts.

In this study, the significant effect of orthodontic treatment needs on life satisfaction of orthodontic patients agrees with the study of Kiyak et al,⁴⁸ who found that orthodontic patients thought that life in general was less satisfying and viewed themselves less positively. This could be because orthodontic patients suffer psychologically from dental and facial deformities with an associated decrease in self-confidence that accompanies those changes.⁹

Some methodologic limitations must be considered in the general relevance of these results. First, since our objective was to assess the impact of different orthodontic treatment needs on the quality of life of young adult orthodontic patients, our participants were orthodontic patients with a perceived need for orthodontic treatment. However, they did not represent the entire young adult population with varying levels of malocclusion and orthodontic treatment needs who might have different impacts on their daily activities. Second, the relevance of observations of young adults for older patients is limited, because the importance of physical attractiveness in young adults appears to be greater.

Based on these results, it could be justified that an OHRQOL tool is recommended for assessing orthodontic treatment needs and consequently improving the quality of care. With the possibility that allocation of resources in the future might be influenced by these data, our specialty can no longer afford to ignore these concepts.

CONCLUSIONS

These results highlight the impact of malocclusion on OHRQOL of young adults and emphasize the importance of patient-based evaluation of oral health status and oral health needs.

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