The association of oral health–related quality of life and self-perceived esthetic impairment with orthodontic treatment seeking

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Aim: To assess oral health–related quality of life (OHRQOL) and self-perceived esthetic impairment in patients seeking orthodontic treatment and to compare them with peers in the same age group who had never undergone orthodontic treatment. A correlation between OHRQOL and lower self-perceived esthetic impairment was also searched for. Methods: The sample comprised 209 individuals (12 to 20 years of age), of whom 110 were about to receive or had already started orthodontic treatment at Shiraz Dental School, Shiraz, Iran, (orthodontic group) and 99 participants who had never received orthodontic treatment (control group). OHRQOL was recorded with the validated Persian version of the short form of the Oral Health Impact Profile. The aesthetic component (AC) of the Index of Orthodontic Treatment Need (IOTN) instrument was used to record examiner and self-perceived esthetic impairment in both groups. Results: The Mann-Whitney test revealed that the orthodontic group had significantly worse OHRQOL than the control group (P = .005). The former group also had significantly higher self-perceived IOTN AC scores (P < .00). The weighted Kappa test was used to report the agreement between the examiner and self-perceived esthetic impairment. No significant intersex differences were found in either group. The Spearman correlation coefficient showed a significant correlation between higher IOTN AC scores and worse OHRQOL (P = .007) in the control group. No such correlation was found in the treatment group. Conclusion: Individuals who sought orthodontic treatment had higher self-perceived IOTN AC scores and worse OHRQOL than the control group. ORTHODONTICS (CHIC) 2012;13:226–233.

Key words: esthetic impairment, orthodontic treatment need, quality of life
The World Health Organization has defined health as “a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity.” It is therefore evident that oral disorders and their impact on physical and psychologic well-being should not be overlooked. More focus has recently been placed upon the patients’ own perception of their oral health status. The way malocclusion is perceived by patients and how it affects their self-consciousness differ and might not be entirely in accordance with the severity of malocclusion or the actual need for orthodontic treatment. The impact of malocclusions and oral disorders on social acceptance and self-image affects oral health–related quality of life (OHRQOL).

The measurement of OHRQOL along with clinical findings can be a good predictor of the need for orthodontic treatment and its outcomes. Different methods have been utilized to assess the impact of oral health on the quality of life, among which the Oral Health Impact Profile (OHIP) is widely used. This index is based on Locker’s adaptation of the World Health Organization’s classification of impairments, disabilities, and handicaps. The original OHIP was composed of 49 items developed by Slade and Spencer, based on the conceptual framework of Locker. The short form of this questionnaire consists of 14 items (OHIP-14) and is categorized into seven domains: functional limitation, psychologic discomfort, physical pain, physical disability, psychologic disability, social disability, and handicap. The OHIP-14 has been successfully used to assess the impact of oral health on quality of life in adolescents in the United States, Iran, Brazil, Chile, Myanmar, and Saudi Arabia.

The Index of Orthodontic Treatment Need (IOTN) is a scoring system for malocclusion. It consists of two different components: the dental health component (DHC) and the aesthetic component (AC). It has been suggested that the IOTN AC is sufficient to assess orthodontic treatment need. The AC consists of 10 color photographs arranged in order from most attractive (grade 1) to least attractive occlusion (grade 10) (Fig 1).

The literature holds little evidence regarding the association between orthodontic treatment seeking and OHRQOL, nor self-perceived esthetic impairment. The present study was designed to evaluate the association between patients’ perception of their orthodontic treatment need (self-perceived IOTN AC score), as well as examiner IOTN AC score and OHRQOL, and to compare OHRQOL between those who sought orthodontic treatment and those who did not.
Association of oral health–related quality of life and self-perceived esthetic impairment

METHODS

The sample for this cross-sectional study comprised 209 young adults ranging in age from 12 to 20 years (99 males and 110 females; mean age, 17 years). The study sample was divided into two groups. The orthodontic group included 109 individuals who were scheduled to receive orthodontic treatment at the Orthodontics Department of Shiraz Dental School. The control group included 100 persons from a nearby public high school as well as Shiraz University students. Before the study began, the participants were assured that the results of the survey would remain confidential, and informed consent was obtained from all of them.

The exclusion criteria were chronic medical disease, untreated dental caries, tooth loss due to trauma or caries, facial anomalies such as cleft lip and palate, and congenital syndromes, since these conditions might affect OHRQOL.

Each participant was asked to complete two survey instruments. In the first (the IOTN), 10 color pictures were shown to each participant. They were asked to mark the image they felt resembled their dentition most closely. If the participant had already started orthodontic treatment, he or she was asked to mark the image that most closely resembled his or her dentition prior to orthodontic treatment. Clinical examinations were also conducted to assess the severity of malocclusion based on a professional viewpoint of an orthodontist using the IOTN AC scoring system. The patient’s treatment need was categorized as: (1) AC grades 1 to 4, representing no need for orthodontic treatment; (2) grades 5 to 7 for borderline need; or (3) grades 8 to 10, defining a definite need for treatment as suggested by Hunt et al. The participants were also asked to complete the Persian shortened version of the OHIP-14 questionnaire as the instrument used to assess OHRQOL. The Persian version of OHIP-14 was shown to be a reliable and valid measure for native Persian speakers. Responses were made on a five-point Likert-type scale (never, hardly ever, occasionally, fairly often, and very often).

The impact of oral health on different daily activities was assessed on the basis of the results obtained from the OHIP questionnaire.

Statistical analysis

Ordinal responses to the OHIP-14 questionnaire were coded from 0 (“very often”) to 4 (“never”). Each participant’s coded responses were summed to obtain the final OHIP score, which ranged from 0 to 56. Higher scores indicate a better OHRQOL.

The IOTN AC scores ranged from 1 to 10. The cut-off point above which orthodontic treatment was required was 5, as used by Mandall et al., a criterion that has been used in other studies.
The chi-square and Mann-Whitney tests were used to analyze the differences in IOTN and OHIP scores between the two groups. The Spearman correlation coefficient was used to assess the correlation between IOTN and OHIP in each group. To assess the effect of different variables on OHIP score, multiple regression analysis was performed. The significance level was set at .05.

The weighted Kappa test was used to assess the agreement between the examiner and the self-perceived IOTN AC score.

RESULTS

The results showed that the OHIP scores were significantly lower in the orthodontic group \( (P = .005) \) compared with control participants, but there were no significant differences in OHIP score between males and females in either group. The orthodontic group had lower scores in all seven domains of the OHIP.

The scores for self-perceived IOTN AC ranged from 1 to 10 in the entire sample. There was a statistically significant difference in the IOTN score between the two groups \( (P < .001) \). With an IOTN score of 5 as the cut-off point for borderline orthodontic treatment need,\(^9,23,24\) it was found that in the orthodontic group, 32.3% of the participants needed treatment, whereas only 11.1% belonged to this category in the control group. The chi-square test showed the difference to be significant \( (P < .001) \). When the distribution of IOTN scores greater than 8 was compared between the two groups, 22.5% of the orthodontic group and only 2.8% of the control group fell in this category \( (P < .001) \). The statistical data for IOTN AC scores in both groups are summarized in Table 1.

The Spearman correlation coefficient revealed that there was a significant inverse correlation between the IOTN and OHIP score in the control group \( (P = .007, r = -0.322) \), but this correlation was not found in the orthodontic group (Table 2).

To evaluate the effect of different confounding variables on the OHIP score, regression analysis was used. When the variables age, sex, and IOTN score were controlled for, there was no significant difference in OHRQOL between the two groups. It was also shown that for every unit increase in the IOTN

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### Table 1  IOTN AC scores of the participants in the orthodontic and control groups categorized based on their orthodontic treatment needs

<table>
<thead>
<tr>
<th>IOTN Self-perceived AC scores</th>
<th>Orthodontic group (%)</th>
<th>Control group (%)</th>
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</thead>
<tbody>
<tr>
<td>Score 1–4 (No need for treatment)</td>
<td>67.6</td>
<td>88.9</td>
</tr>
<tr>
<td>Score 5–7 (Borderline treatment need)</td>
<td>9.8</td>
<td>8.83</td>
</tr>
<tr>
<td>Score 8–10 (Definite need for treatment)</td>
<td>22.5</td>
<td>2.8</td>
</tr>
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IOTN, Index of Orthodontic Treatment Need; AC, aesthetic component.

### Table 2  Correlation between IOTN (self-perceived) and OHIP in the orthodontic and control groups

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<thead>
<tr>
<th></th>
<th>Spearman correlation</th>
<th>P value</th>
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<tbody>
<tr>
<td>Orthodontic group</td>
<td>-0.322</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Control group</td>
<td>-0.111</td>
<td>.297</td>
</tr>
</tbody>
</table>

\( ^* \)Significant correlation.
score, the mean OHIP score decreased 1.4 points \( (P = .001) \). Logistic regression showed that patients in the group that sought orthodontic treatment were 1.4 times more likely to have a higher IOTN score and were 0.97 times more likely to have worse OHRQOL.

The weighted Kappa test was also used to evaluate the agreement between the examiner and participants in assessing the IOTN AC scores. The agreement was reported to be perfect in the orthodontic group (0.82) and moderate in the control group (0.61). Tables 3 and 4 outline the distribution of AC scores in the orthodontic and the control groups, respectively, as allocated by the examiner and the participants.

**DISCUSSION**

This cross-sectional study is one of the first in Iran to assess the relationship between orthodontic treatment need and OHRQOL with the validated Persian version of the OHIP-14. More emphasis has recently been placed upon using laypeople to evaluate orthodontic treatment need or quality of life.\(^9,21,25\) In this study, self-perceived and examiner IOTN AC scores and OHRQOL were used as predictors of orthodontic treatment need. This approach is similar to the method used by Calis et al.\(^26\) Mandall et al.\(^9\) on the other hand, believed that IOTN AC scores might be sufficient for orthodontic treatment planning in a given population, although they also noted that to take into account all those who need treatment, the DHC might also be needed. Esthetics has been considered a need for treatment as important as concerns about dental health.\(^27\) The self-perceived IOTN AC score is obtained differently from the DHC score, which mainly considers occlusal discrepancy and functional disability.\(^21\) But most previous studies have reached the conclusion that it is the esthetic impairment of malocclusion and its subsequent adverse effect on psychologic well-being that most influences an individual, not the functional disabilities.\(^21,28,29\) Since the mean age of the participants in this study was 17 years, we assume

<table>
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<th>Table 3</th>
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<tr>
<td>IOTN AC scores</td>
<td>Participant (%)</td>
</tr>
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<td>Score 8–10 (Definite need for treatment)</td>
<td>22.5</td>
</tr>
</tbody>
</table>

Weighted Kappa, 0.822; P value, .0001. IOTN, Index of Orthodontic Treatment Need; AC, aesthetic component.

<table>
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<tr>
<th>Table 4</th>
<th>IOTN AC scores of participants in the control group as allocated by the examiner and the participants</th>
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<tr>
<td>IOTN AC scores</td>
<td>Participant (%)</td>
</tr>
<tr>
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<td>88.9</td>
</tr>
<tr>
<td>Score 5–7 (Borderline treatment need)</td>
<td>8.3</td>
</tr>
<tr>
<td>Score 8–10 (Definite need for treatment)</td>
<td>2.8</td>
</tr>
</tbody>
</table>

Weighted Kappa, 0.616; P value, .0001. IOTN, Index of Orthodontic Treatment Need; AC, aesthetic component.
that they were mature enough to make a sound judgment of their dental esthetics, whereas this may not be the case for younger patients. Moreover, an appropriate evaluation of psychologic and social aspects of malocclusion is only possible through proper measurement of dental esthetics.

The cut-off point for AC score that indicates orthodontic treatment need has been debated. Mandall et al and Feu et al defined AC scores greater than 5 as evidence of a borderline need for orthodontic treatment, and scores greater than 8 as definite need for treatment. The cut-off value for orthodontic intervention in the study by Stenvik et al was AC grade 5. In contrast, Hunt et al believed that grade 4 should also be added to the treatment need category. Kok et al used self-perceived AC scores of 6 and higher as their criteria for orthodontic treatment need. In the present study, the cut-off value was a score of 5 or higher. Based on this definition, participants in the orthodontic treatment–seeking group felt a significantly higher need for treatment than the control group.

It has been stated that laypeople might not be as aware regarding their need for orthodontic treatment as clinicians. Previous studies using IOTN AC scores as a means to define the need for orthodontic treatment concluded that the professionals tend to assign higher scores to an individual than the participants themselves. However, in the present study, an agreement was found to exist between the professional and participants. This is in accordance with the results of Hamdan et al, who reported the median ranking of the AC scores to be similar between dentists and patients. However, orthodontists were excluded from the former study. In the present study, the agreement was higher in the orthodontic group, while in the control group, the agreement was reported to be moderate. It is likely that those participants who were not planning to undertake orthodontic treatment were more defensive toward their attractiveness, while those who were in the orthodontic group had a more realistic opinion regarding their looks.

The OHIP-14 questionnaire has been widely used in different societies to evaluate the impact of malocclusion on the quality of life. Moreover, an assessment of its reliability and validity showed that this instrument is appropriate for use in the Iranian population. Our participants who sought orthodontic treatment had a more negative OHRQOL than the control group, since this condition usually encourages individuals to seek treatment. Our results were therefore not unexpected. These results were consistent with the studies of Feu et al and Hassan et al.

As in previous studies, the social and psychologic domains of the OHRQOL were the most clearly affected. Participants’ sex did not significantly affect the OHRQOL in either group. Hassan et al reported the same result, whereas another study found that sex significantly affected the impact of malocclusion on OHRQOL. The number of males and females who agreed to participate in our study was almost the same. However, most studies published to date have suggested that more females than males seek orthodontic treatment. Therefore, we may speculate that had more females taken part in this study, the results might have been different.

In our study, there was a significant correlation between dental esthetic self-perception and quality of life in the control group. That is, as OHRQOL worsened, self-perceived IOTN AC scores increased. This was not the case in the group who sought treatment, as no significant correlation was found. It cannot be overlooked that OHRQOL is also dependent on individual personality characteristics, and a malocclusion that might not look so severe to one person can have a negative impact on daily activities of another individual. For those seeking orthodontic treatment, the negative impact of malocclusion on the quality of life is not always consistent with the severity of malocclusion.
Kok et al stated that OHRQOL is a better predictor of an individual’s orthodontic concern than the IOTN AC score. Whether treatment uptake can be better predicted using quality of life measures is unclear.33 The odds ratio showed that in our total sample, each 1-point increase in self-perceived IOTN AC score was associated with a 1.14-point decrease in the mean OHIP score. In a previous study, AC scores correlated poorly with the Oral Aesthetic Subjective Impact Scores (OASIS) measure,34 whereas Kok et al found a correlation between self-perceived dental esthetics and worse OHRQOL.33

There were some limitations in the methodology of this study. The examiner AC score or DHC score could be used to evaluate professionals’ assessments of the actual treatment need of the population and its impact on quality of life. In addition, different types of malocclusion could be evaluated separately in future studies to relate the impact of the type of malocclusion on OHRQOL. The socioeconomic status of each individual affects orthodontic treatment seeking, and we suggest that more emphasis could be placed on this aspect of the patients’ lives.

CONCLUSION

In this cross-sectional study, participants who sought orthodontic treatment had worse OHRQOL than those who did not. Because patient-based evaluations reflect the impact of malocclusion on quality of life, they should be taken into account along with professional examination and diagnostic records. Individual self-perceived esthetic impairment did not correlate significantly with OHRQOL in patients who wished to start orthodontic treatment. This highlights the importance of differences in personality traits in framing esthetic problems.

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REFERENCES