

Quality of Life Based on Oral Health Impact Profile among Adolescents Undergoing Fixed Orthodontic Appliances

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Abstract

Background

Dental malocclusion is one of the most common developmental anomalies. Fixed orthodontics as one of the treatments of malocclusion are referred to as mechanical devices that are attached to the teeth. This study assessed quality of life (QOL) based on oral health impact profile (OHIP) amongst Iranian patients undergoing fixed orthodontic appliances in orthodontic center of Sari, Iran.

Materials and Methods

This is a prospective controlled longitudinal study on 14-19 year-old patients with fixed orthodontic appliances in orthodontic centers of Sari, Iran, in 2018. The 4th and 5th grade of orthodontic treatment need (IOTN) subjects were enrolled in the study. QOL was assessed based on OHIP questionnaire at the beginning of the study before placing braces (T0), a day after placing braces (T1), and three months after placing braces (T2) for all subjects. Data were analyzed by SPSS version 24.0.

Results

The number of 290 patients (145 male and 145 female) were investigated. The average age of participants was 17 ± 1.94 years. The average QOL at three T0, T1, T2 times showed that the QOL of patients in T0 (19.66 ± 10.19) was at the lowest value, in T1 (29.53 ± 15.14) it was moderate and in T2 (17.84 ± 9.22) it was good, and these changes were statistically significant ($P < 0.05$). The results of correlation test showed that age had no significant correlation with QOL at any stage of measuring QOL (T0: $r = -0.008$, $P = 0.89$; T1: $r = 0.031$, $P = 0.6$; T2: $r = -0.007$, $P = 0.91$).

Conclusion

The results of this study showed that QOL increases after orthodontics. The average score of the QOL in T1 was at its lowest value, but T2 had a good QOL. The QOL of men and women was not different in any of the three measuring stages.

Key Words: Adolescents, Oral Health, Orthodontic Appliance, Quality of Life.

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1- INTRODUCTION

Oral and dental anomalies deviations from the growth and abnormality of natural standards in a society that can affect the bones and muscles of face and jaw (1). The disruptive proportions and asymmetry affect the disruption of facial beauty (2). Dental malocclusion is one of the most common developmental anomalies. In tooth and jaw anomalies, in addition to the probable effects on nutrition due to its effect on one's appearance and face, it has a psychologically negative effect on the person's morale. Also, it increases the susceptibility to strike, periodontal disease, and tooth decay (3). The key to success in achieving patient satisfaction with treatment outcomes is obtaining a beautiful and pleasant smile in orthodontics (4).

Since hereditary and environmental factors play an important role in the malocclusion's creation, the prevalence of these anomalies is different in various races and countries (5). Fixed orthodontic as one of the treatments of malocclusion are referred to as mechanical devices that are attached to the teeth by cement or by adhesive materials and are not movable by the patient (2). It consists of two parts: an inactive part that includes a band, brace, buccal tube, lingual attachment, lock pin, and an active part that includes Archwire, spring, elastic, and separator. Fixed devices have many advantages. There are a variety of dental replacements such as bodily replacement, rotation, tapping, intrusion, extrusion, and root replacement. It can also be used in most malocclusions and can move multiple teeth simultaneously (6).

However, fixed devices also have some disadvantages, the most important of which is the difficulty in oral hygiene when using these devices. They are also more expensive than mobile devices, and if a part of the device is damaged, the patient cannot correct it and may need to

be referred to an orthodontist and aesthetically, they are more noticed (2). The World Health Organization in 1948, defined health as perfect physical, mental, and social welfare. According to this definition, health is not just the absence of disease; it was therefore necessary to measure health and evaluate the results of treatment interventions not only by quantitative indicators of frequency and severity of illness but to consider the total health status of individuals (7). According to this, the organization defines the quality of life (QOL) as an individual's understanding of their position in the life, culture, and value system in which they live and how it relates to their goals, expectations, and standards (8).

QOL is a structure that ideally evaluates health from a multidimensional perspective, including physical, psychological, social, and environmental aspects. This method evaluates perceptions and mental impressions of one's own life and health, life preferences, and illness effects such as socioeconomic costs (9, 10). Therefore, the QOL is quite individualistic and is not observable by others and is based on the people's perception of different aspects of their lives (11). In recent years, QOL has been recognized as an important part of health and has been considered in the assessment of therapeutic and health programs (12).

Nowadays, many governments and decision-makers at the macro-level of sociology realize the QOL promotion and subsequently health promotion, as an integral part of socio-economic development (13). There are many studies on QOL in different dental fields. Since orthodontics and applied openings may interfere with the patient's daily life and cause harm to the patient in speech, chewing, presence of the patient in the community, and psychological effects, some patients refuse to pursue and treat their problem despite having jaw and

dental anomalies. Another point about fixed orthodontic appliances is the problem of hygiene and its implications, of course, provided adequate and sufficient training, patients are usually careful to perform health care during therapy. Therefore, given the prevalence of malocclusion and the necessity of orthodontics, this study will review the QOL based on oral health impact profile (OHIP) amongst Iranian patients undergoing fixed orthodontic appliances in the orthodontic center of Sari, Iran.

2- MATERIALS AND METHODS

2-1. Study design and population

This is a prospective controlled longitudinal study on 14-19-year-old patients with fixed orthodontic appliances in orthodontic centers of Sari, North of Iran, in 2018. According to the results of previous studies (14), and considering confidence level (CI) of 95% and acceptable error of 0.07, the sample size was estimated to be 290 people, and 145 females and 145 males were selected due to the random number table.

2-2. Method

The subjects with grades 4 and 5 were enrolled in the study according to the severity of malocclusion derived from the index of orthodontic treatment need (IOTN) based on orthodontist's opinion. For patients a bracket bonding system, a similar braces type, a similar band type, and an American orthodontics system were used. Patients with any craniofacial anomalies or syndrome, previous orthodontics history, requiring orthognathic surgery, and psychiatric therapy were excluded from the study.

2-3. Measuring tool

A standard questionnaire called OHIP, whose questions were designed in 1994 (15), was the tool for this research. The questionnaire consisted of 7 domains of

functional limitation, physical pain, mental pain, physical disability, mental disability, social disability and complete disability, and the validity and reliability of the Persian version of the questionnaire has been evaluated and confirmed (Cronbach's alpha = 0.85), (10, 16). In this study, a summarized questionnaire containing 14 questions from the OHIP-49 main index (17-19) was used. Each of the questions had five points based on the Likert scale for answering, and 0 to 4 points according to the Likert scale for never, rarely, sometimes, most often and almost always answers, respectively. The total score of each questionnaire ranged from 0 to 56. The QOL score determined the range of 0-18.7 as good, 18.6-37.3 as moderate, and 37.4-56 as poor. The questionnaire was completed at the beginning of the study, before placing braces (T0), a day after placing braces (T1) and three months after placing braces (T2).

2-4. Ethical consideration

This study was conducted after approval by the Mazandaran University of Medical Sciences Research and Technology Deputy and by the Ethics Committee on Biomedical Research (Ethics Code: IR.MAZUMS.REC.1397.1648), and with obtaining the informed consent of the participants. Participants were assured that their information would be kept confidential.

2-5. Data Analyses

In this study, Kolmogorov-Smirnov and Shapiro Wilks test were used to evaluate the normality of quantitative data. Data were also analyzed through Q-Q chart and skew index. Little data followed the normal distribution. Analyzing data was conducted as frequency, percentage, mean, and standard deviation. Comparison of total and subgroup QOL scores by sex was performed by Mann-Whitney test. Also, the correlation between age and QOL score was analyzed by Spearman test.

Significance level was considered less than 0.05. Data were analyzed by SPSS version 24.0 software.

3- RESULTS

The number of 290 patients (145 males and 145 females) were investigated. The average age of participants was 17 ± 1.94 years. The average age in men was 17.06 ± 2.02 years, and in women was 16.94 ± 1.85 . There was no significant relationship between age and sex ($P = 0.61$). The average QOL at three times (T0, T1, T2) showed that the QOL of patients in T0

(19.66 ± 10.19) was low, T1 (29.53 ± 15.14) was moderate and in T2 (17.84 ± 9.22) was good, which were statistically significant ($P < 0.05$) (**Figure.1**). Differences in QOL between both genders were low and had no significant relationship with gender at any time of study (**Table.1**). There is a significant difference between the average rank of QOL in T1 (2.68) with T0 (1.7), and T3 (1.62) ($P < 0.001$). The results of correlation test showed that age had no significant correlation with QOL at any stage of measuring QOL (**Table.2**).

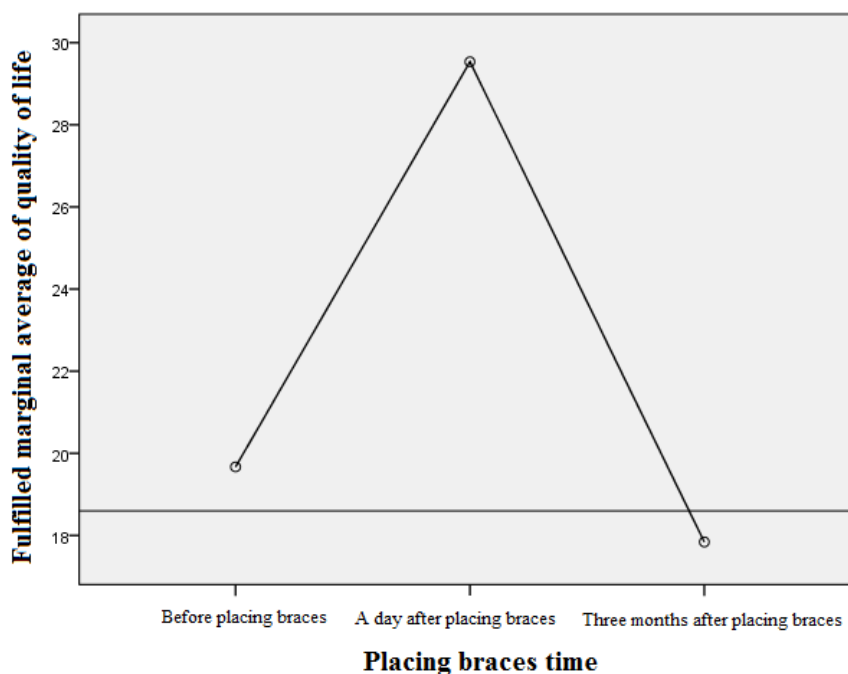


Fig.1: Average QOL in three times (T0, T1, T2) of patient's measuring [before placing braces (T0), a day after placing braces (T1), and three months after placing braces (T2)].

Table-1: Difference in QOL by Gender at T0, T1, T2.

QOL	Gender	Mean± SD	P-value*
T0	Female	19.53 ± 10.25	0.81
	Male	19.8 ± 10.17	
T1	Female	29.27 ± 15.01	0.85
	Male	29.79 ± 15.31	
T2	Female	17.70 ± 9.02	0.94
	Male	17.97 ± 9.44	

* Mann-Whitney test.

Table-2: The correlation of age of patients with QOL.

Variable		T0	T1	T2
Age of patients	The correlation coefficient	-0.008	0.031	-0.007
	*P-value	0.89	0.6	0.91

*Spearman's correlation.

4- DISCUSSION

The results of this study showed that QOL increases after orthodontics. The average score of the QOL in T1 was at its lowest value, but T2 had a good QOL. The QOL of men and women was not different in any of the three measuring stages. Therapeutic interventions can have an impact on the QOL of patients. Due to the prolonged fixed orthodontics process and its effects on different aspects of QOL associated with the oral and dental health and functions, further studies are needed in order to understand patient status during treatment and using techniques and systems that have the least interventions and negative effects on QOL of the patient. Shaw et al., have suggested that the apparently unacceptable psychosocial complications can be as much as or even greater than biological problems (20). Kragt et al., in their study, found that malocclusion had no significant effect on psychosocial complications. On the other hand, the impact of malocclusion is different with age and sex. In other words, this effect is dependent on age and sex (21). According to the results of various studies, it is deduced that there are differences in relation between age and sex and psychosocial complications. In the review study of Kragt et al., psychosocial complications were investigated and could justify the difference in results. Agbaje et al. (2018) evaluated initial changes in QOL associated with oral and dental health among 11-46 year-old patients with fixed orthodontic appliances in Nigeria. The type of used questionnaire was different from our study and it was presented to patients at the beginning of treatment, one week later, one month later, three months

later, and six months later. They stated that QOL associated with oral and dental health has improved during the studied period and thus, fixed orthodontic appliances can significantly improve the QOL of individuals (22). The results of this study are consistent with the present study. A study by Chen et al., evaluated the impact of malocclusion on QOL associated with oral hygiene in young 18-25 year-old patients. IOTN index and OHIP-14 questionnaire were used before and after orthodontics. The results of their study indicate that before the treatment, the mean total score of OHIP-14 had the highest effect on the mean score in the field of psychological problems (23). This finding suggests that malocclusion affects the QOL of a person. Therefore, the results of this study indicated that malocclusion has a significant negative impact on QOL related to oral hygiene, especially in terms of disability and mental pain. Malocclusion orthodontics improves QOL associated with oral hygiene. These findings are similar to the present study. A study by Masood et al., named the impact of malocclusion on QOL related to oral hygiene in 2013. The results of this study showed that malocclusion has a significant negative impact on QOL related to oral hygiene and its dimensions and has the greatest impact on the dimension of mental pain, and no differences were reported between men and women (24). This finding is consistent with the present study. In general, previous studies mostly evaluated the impact of malocclusion on QOL, but in the present study, fixed orthodontic appliances were evaluated and compared with the QOL of patients before and during treatment. Therefore, this issue is deemed to be a strength of the present

study. Mansour et al. (2012) examined the changes in the QOL of mouth and tooth after 24 hours of fixed orthodontic appliances and used the OHIP-14 questionnaire. The results of their study showed that the total score of oral health-related QOL was significantly higher at 24 hours after placement (10.9 ± 43.5) than before placement (9.2 ± 34.1), (25). This finding is consistent with the results of the present study. However, they observed a statistically significant relationship between sex and QOL, whereas in the present study such relationship was not observed, therefore it is different from their study. The reason for this difference can be due to differences in measuring times. Since in the present study, the overall trend of QOL change in a 3-month follow-up was examined with sex variable, but Mansour et al. only studied it before and after placing fixed appliance. Ethnic reasons can also be considered because the study of Mansour et al., was conducted in Malaysia and the present study was performed in Iran. In analyzing the results of this study, it can be stated that the poor QOL the day after placing braces, the patient's pain is the result of placing braces, wrists and wires, irritation of the mucous and wound, the patient's mouth's unfamiliarity with appliance and chewing problems and sometimes speech. It is also observed that the mean score of QOL in T2 is lower than T0 mood, which indicates a better QOL. This finding may be due to the relative improvement of the patient's anomalies caused by orthodontics as well as the patient's compliance with the mouth conditions over time.

5- CONCLUSION

In analyzing the results of this study, it can be stated that the poor QOL the day after placing braces, the patient's pain is the result of placing braces, wrists and wires, irritation of the mucous and wound, the patient's mouth's unfamiliarity with appliance and chewing problems and

sometimes speech. It is also observed that the mean score of QOL in T2 is lower than T0 mood, which indicates a better QOL. This finding may be due to the relative improvement of the patient's anomalies caused by orthodontics as well as the patient's compliance with the mouth conditions over time. It is suggested that studies be performed in the same way, after anomaly correction, by evaluating the QOL after removing braces. It is also suggested to examine the impact of various orthodontic appliances on QOL such as orthodontics with clear aligner, movable plaques, ceramic braces, and lingual orthodontics system, and to compare them with metal braces.

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7- CONFLICT OF INTEREST: None.

8- REFERENCES

1. Mohanty P, Prasad N, Sahoo N, Kumar G, Mohanty D, Sah S. Reforming craniofacial orthodontics via stem cells. *Journal of International Society of Preventive & Community Dentistry*. 2015;5(1):13.
2. Proffit WR, Fields HW, Sarver DM. *Contemporary Orthodontics-E-Book*: Elsevier Health Sciences; 2014.
3. Sinclair S. Male infertility: nutritional and environmental considerations. *Alternative medicine review: a journal of clinical therapeutic*. 2000;5(1):28-38.
4. Van Loendersloot L, Van Wely M, Limpens J, Bossuyt P, Repping S, Van Der Veen F. Predictive factors in in vitro fertilization (IVF): a systematic review and meta-analysis. *Human reproduction update*. 2010;16(6):577-89.
5. de La Rochebrochard E, Quelen C, Peikrishvili R, Guibert J, Bouyer J. Long-term outcome of parenthood project during in vitro fertilization and after discontinuation of

- unsuccessful in vitro fertilization. *Fertility and sterility*. 2009;92(1):149-56.
6. Gerami A, Dadgar S, Rakhshan V, Jannati P, Sobouti F. Displacement and force distribution of splinted and tilted mandibular anterior teeth under occlusal loads: an in silico 3D finite element analysis. *Progress in orthodontics*. 2016 Dec 1;17(1):16.
 7. Aaronson N, Ahmedzai S, Bergman B. *Quality of Life: Assessment, Analysis, and Interpretation*. New York: John Wiley; 2000.
 8. Parciak EC, Dahiya AT, AlRumaih HS, Kattadiyil MT, Baba NZ, Goodacre CJ. Comparison of maxillary anterior tooth width and facial dimensions of 3 ethnicities. *Journal of Prosthetic Dentistry*. 2017;118(4):504-10.
 9. Ebrahimpour A, Rahbar F, Ghasemi H, Taghian M, Pashmaki M. Evaluation of Facial Anthropometric Index among 15-20 Year Old Individuals in Sari City. *HELIX*. 2017;7(2):1083-87.
 10. Jabarifar SE, Birjandi, N, Khadem, P, Farsam T, Falinezhad F., Javadi FM. Relationship between quality of life and oral health in 18-45 year-old subjects referring to Khorasgan School of Dentistry in 2010-2011. *Journal of Isfahan Dental School*, 2012;8(1):109-17.
 11. Krajicek DD. Natural appearance for the individual denture patient. *Journal of Prosthetic Dentistry*. 1960;10(2):205-14.
 12. Wöstmann B, Budtz-Jørgensen E, Jepson N, Mushimoto E, Palmqvist S, Sofou A, et al. Indications for removable partial dentures: a literature review. *The International Journal of Prosthodontics*, 01 Mar 2005, 18(2):139-45.
 13. Kumar MV, Ahila S, Devi SS. The science of anterior teeth selection for a completely edentulous patient: a literature review. *The Journal of Indian Prosthodontic Society*. 2011;11(1):7-13.
 14. Nagarajappa R, Ramesh G, Sandesh N, Lingesha R-T, Hussain M-A-Z. Impact of fixed orthodontic appliances on quality of life among adolescents' in India. *Journal of clinical and experimental dentistry*. 2014;6(4):e389.
 15. John M, Hujoel P, Miglioretti D, LeResche L, Koepsell T, Micheelis W. Dimensions of oral-health-related quality of life. *Journal of dental research*. 2004;83(12):956-60.
 16. Navabi N, Nakhaee N, Mirzadeh A. Validation of a Persian version of the oral health impact profile (OHIP-14). *Iranian journal of public health*. 2010;39(4):135.
 17. John MT, Patrick DL, Slade GD. The German version of the Oral Health Impact Profile--translation and psychometric properties. *Eur J Oral Sci* 2002; 110(6): 425-33.
 18. Slade GD., Spencer AJ. Social impact of oral conditions among older adults. *Australian Dental Journal* 1994; 39:358-64.
 19. Slade GD, Spencer AJ, Locker D, Hunt RJ, Strauss RP, Beck JD. Variations in the social impact of oral conditions among older adults in South Australia, Ontario, and North Carolina. *J Dent Res*.1996;75(7):1439-50.
 20. Shaw WC. The influence of children's dentofacial appearance on their social attractiveness as judged by peers and lay adults. *Am J Orthod*. 1981;79(3):399-415.
 21. Kragt L, Dharmo B, Wolvius EB, Ongkosuwito EM. The impact of malocclusions on oral health-related quality of life in children-a systematic review and meta-analysis. *Clin Oral Investig*. 2015;20(8):1881-94.
 22. Agbaje HO, Kolawole KA, Otuyemi OD. Evaluation of early changes in oral health-related quality of life amongst Nigerian patients undergoing fixed orthodontic appliance therapy. *International orthodontics*. 2018;16(3):571-85.
 23. Chen M, Feng Z-C, Liu X, Li Z-M, Cai B, Wang D-W. Impact of malocclusion on oral health-related quality of life in young adults. *The Angle Orthodontist*. 2014;85(6):986-91.
 24. Masood Y, Masood M, Zainul NNB, Araby NBAA, Hussain SF, Newton T. Impact of malocclusion on oral health related quality of life in young people. *Health and quality of life outcomes*. 2013; 11(1):25.
 25. Mansor N, Saub R, Othman SA. Changes in the oral health-related quality of life 24 h following insertion of fixed orthodontic appliances. *Journal of orthodontic science*. 2012;1(4):98.