ORIGINAL PAPER

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Comparison of Oral Health-Related Quality of Life in Treated and Non-Treated Orthodontic Patients

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ABSTRACT

Introduction: Malocclusion as an oral disorder can cause negative impact on individuals oral conditions, social interactions and self-esteem. **Aim:** The aim of this study was to compare oral health-related quality of life (OHQoL) of patients who had received fixed orthodontic treatment and patients who had not received fixed orthodontic treatment. **Materials and methods:** Data were collected from 178 participants attended at professional dental office (mean age 22.71 years) in two groups (experimental and control). The experimental group comprised of 90 subjects who were in the retention phase, after their orthodontic treatment, and the control group comprised of 88 untreated subjects. Oral Health Impact Profile (OHIP-14) was used to assess the patients oral health related quality of life (OHQoL). **Results:** The control group had significantly higher OHIP-14 scores than experimental group ($p < 0.001$). Participants with treatment need reported a significantly greater negative impact on the overall OHRQoL score. **Conclusion:** Subjects with no history of orthodontic treatment had more negative oral health related quality (OHRQoL), than subjects who had completed orthodontic treatment. Dental malocclusion has significant negative impact on OHRQoL.

Keywords: Oral Health Impact Profile (OHIP), Oral health related quality of life (OHQoL), Orthodontic treatment.

1. INTRODUCTION

Malocclusion as an oral disorder is highly prevalent and can unfavorably affect social, physical and psychological well-being of patients (1-3). Malocclusion can impair the quality of life in many people and affect various aspects of life, including function, appearance, and interpersonal relationships (4). Various types of orthodontic appliances are used to treat dental malocclusions, and need for orthodontic treatment in dental clinics is evaluated using certain measures, like index of orthodontic treatment need (IOTN), proposed by Brook and Shaw.(5) The Index of Orthodontic Treatment Need (IOTN) is a scoring system for malocclusion, which has been used extensively in the literature to evaluate actual and perceptive orthodontic treatment needs (6, 7). Traditionally, clinicians and researchers have been focused on the clinically based measures of outcome for orthodontic treatment, like IOTN index. But in recent years, researchers have been more oriented to patient based assessment of oral health status to better understand their needs and satisfaction with treatment (8, 9). Oral health-related quality of life is a concept that includes subjective evaluation of perceived physical, psychological , and social aspects of oral health. Oral Health Impact Profile (OHIP) questionnaire developed by Slade and Spencer in 1994 and short form OHIP-14 modified by Slade in 1997 has been found reliable and widely accepted for assessment of oral health-related quality of life in individuals with malocclusion (10). The original version of the OHIP scale includes 49 items that are divided into 7 domains. Because of the extensiveness of original form, shortened version of only 14 items of OHIP questionnaire was developed (11). The oral health-related quality of life (OHRQoL) provide an insight into how individual's oral health status affects overall quality of life (QoL) (12-14). In spite of the fact that orthodontic treatment improves oral function, appearance and social well- being of the patients, some researchers didn't find any significant relationship between orthodontic treatment of malocclusion and oral health related quality of life

(15,16) Large number of the studies found a relationship between orthodontic treatment of malocclusion and OHQoL. Oliveira and Sheiham in their study concluded that oral-health quality of life of Brazilian adolescents was significantly improved after they completed orthodontic treatment compared to those who hadn't received orthodontic treatment (17). Leao and Sheiham reported that young patients who had undergone orthodontic treatment had a better quality of life compared to those who had not undergone such a treatment (18). Zhang at al. concluded that orthodontic treatment significantly improved quality of life of their patients 6 months after orthodontic treatment (19).

2. AIM

The aim of this study was to compare oral health-related quality of life (OHQoL) of patients who had receive fixed orthodontic treatment and patients who had not received fixed orthodontic treatment

3. MATERIALS AND METHODS

Data were collected from 178 participants attended at professional dental office (mean age 22.71 years) in two groups (experimental and control). The experimental group comprised of 90 subjects who were in the retention phase, after their orthodontic treatment, and the control group comprised of 88 untreated subjects. The patients in experimental group were selected from the patients who were already referred to a private orthodontic clinic and had received fixed orthodontic treatment. The control group subjects were selected from patients who had been referred to the same private clinic and were candidates for orthodontic treatment. The patients with a history of maxillofacial surgeries, any systemic diseases or mental problems were excluded from the study. The selected subjects were informed about the study, and written informed consent was obtained from patients and parents of the participants. Oral Health Impact Profile (OHIP-14) was used to assess the patients oral health related quality of life (OHQoL). OHIP-14 consists of 14 questions, which measures the quality of life in seven fields of functional limitations, physical problems, mental and emotional problems, physical handicaps, mental and emotional handicaps, social handicaps and complete handicap. An OHIP-14 (Oral Health Impact Profile-14) questionnaire was filled out for all the study parts in one session in the form of an interview. The subject's answers were scored in the Lickert's scale a "zero" for "never", "1" for "seldom", "2" for" sometimes", "3" for "mostly" and "4" for "almost always". On the whole, a score ranging between "0" and "56" is calculated for each subject. Higher OHIP scores indicate worse and lower scores indicate better oral health-related quality of life for the subjects.

Patients treatment needs were categorized with Index of Treatment Need (IOTN).

Statistical analysis

The collected data was analyzed using IBM Statistics SPSS version 25.0. For comparing percentages of the IOTN Pearson's Chi square test was used. For OHIP-14, the descriptive statistics; mean and standard deviation

were calculated and Mann Whitney U test was used to compare ranks for OHIP-14 among the experimental and control group. The correlation between the OHIP-14 and the IOTN was measured using the Spearman's rank correlation coefficients.

4. RESULTS

The comparison of the IOTN between the treated and non-treated subjects indicate that the majority of subjects in both groups had IOTN grade 4, followed in frequency by IOTN grade 2, and the least frequency of

IOTN – Index of treatment need * Group Crosstabulation					
			Group		
			Experimental group	Control group	Total
IOTN – Index of treatment need	Grade 2–Little treatment need	Count	12	11	23
		%	13,3	12,5	12,9
	Grade 3–Moderate treatment need	Count	25	29	54
		%	27,8	33,0	30,3
	Grade 4–Great treatment need	Count	45	40	85
		%	50,0	45,5	47,8
	Grade 5–Very great treatment need	Count	8	8	16
		%	8,9	9,1	9,0
Total		Count	90	88	178
		%	100,0	100,0	100,0

Table 1. Comparison of IOTN between the treated and non-treated subjects. χ2=0,611; p=0,894

Ranks					
	Group	N	Mean Rank	Sum of Ranks	p
Functional limitation	Experimental group	90	82,09	7388,50	0,002
	Control group	88	97,07	8542,50	
Physical pain	Experimental group	90	69,27	6234,50	0,0001
	Control group	88	110,19	9696,50	
Psychological discomfort	Experimental group	90	56,41	5077,00	0,0001
	Control group	88	123,34	10854,00	
Physical disability	Experimental group	90	67,43	6069,00	0,0001
	Control group	88	112,07	9862,00	
Psychological disability	Experimental group	90	66,27	5964,50	0,0001
	Control group	88	113,26	9966,50	
Social disability	Experimental group	90	72,50	6525,00	0,0001
	Control group	88	106,89	9406,00	
Handicap	Experimental group	90	64,50	5805,00	0,0001
	Control group	88	115,07	10126,00	
OHIP-14 total	Experimental group	90	57,83	5204,50	0,0001
	Control group	88	121,89	10726,50	

Table 2. Comparison of mean ranks between the observed groups

Correlations			IOTN – Index of treatment need
Spearman's rho	IOTN – Index of treatment need for both groups	Correlation Coefficient	1,000
		Sig. (2-tailed)	.
		N	178
	Functional limitation	Correlation Coefficient	,528**
		Sig. (2-tailed)	,000
		N	178
	Physical pain	Correlation Coefficient	,616**
		Sig. (2-tailed)	,000
		N	178
	Psychological discomfort	Correlation Coefficient	,436**
		Sig. (2-tailed)	,000
		N	178
	Physical disability	Correlation Coefficient	,548**
		Sig. (2-tailed)	,000
		N	178
	Psychological disability	Correlation Coefficient	,521**
		Sig. (2-tailed)	,000
		N	178
	Social disability	Correlation Coefficient	,446**
		Sig. (2-tailed)	,000
		N	178
	Handicap	Correlation Coefficient	,492**
		Sig. (2-tailed)	,000
		N	178
	OHIP-14 total	Correlation Coefficient	,507**
		Sig. (2-tailed)	,000
		N	178

**. Correlation is significant at the 0.01 level (2-tailed).

Table 3. Correlation analysis for both observed groups

Correlations			OHIP-14 total
Spearman's rho	OHIP-14 total	Correlation Coefficient	1,000
		Sig. (2-tailed)	.
		N	88
	IOTN – Index of treatment need for Control group	Correlation Coefficient	,924**
		Sig. (2-tailed)	,000
		N	88
	Functional limitation	Correlation Coefficient	,755**
		Sig. (2-tailed)	,000
		N	88
	Physical pain	Correlation Coefficient	,947**
		Sig. (2-tailed)	,000
		N	88
	Psychological discomfort	Correlation Coefficient	,994**
		Sig. (2-tailed)	,000
		N	88
	Physical disability	Correlation Coefficient	,951**
		Sig. (2-tailed)	,000
		N	88
	Phycological disability	Correlation Coefficient	,954**
		Sig. (2-tailed)	,000
		N	88
	Social disability	Correlation Coefficient	,885**
		Sig. (2-tailed)	,000
		N	88
	Handicap	Correlation Coefficient	,963**
		Sig. (2-tailed)	,000
		N	88

**. Correlation is significant at the 0.01 level (2-tailed).

Table 4. Correlation analysis for the control group (non-treated subjects)

subjects in both groups with IOTN grade 5. (Table 1) Statistical analysis using chi-square test indicate that there is no statistically significant difference in IOTN among the observed groups (p>0.05) (Graph 1) Malocclusion significantly affected all domains of OHIP-14. The total OHIP-14 score was significantly lower (0.41 : 13.59) in the experimental group compared to control group. (Graph 2) Subjects in control group had significantly higher OHIP-14 mean rank scores than subjects who had completed orthodontic treatment, in experimental group. Comparison of mean ranks between the observed groups confirms the above mentioned statement with highly significant differences at all subscales of the OHIP-14 (app p<0.01). (Table2) Correlation analysis using the Spearman's rank correlation coefficient indicate highly significant (p<0.05) correlation between the all sub domains and the total OHIP-14 and the IOTN score in both observed groups. (Table 3) Meaning that

the IOTN truly reflect the QOL measured by the OHIP-14 questionnaire. In control group, it was observed that patients with high treatment need (grade 4 and 5) according to IOTN, had the highest OHIP-14 score. (Table 4), (Graph 3) Correlation analysis using the Spearman rank correlation coefficient indicate highly significant (p<0.05) correlation between the all sub domains and the total OHIP-14 and the IOTN score in control group. Meaning that the IOTN truly reflect the oral-health related quality of life measured by the OHIP-14 questionnaire for this group.

5. DISCUSSION

In today's practice, clinicians are those who place much more emphasis on patient-based evaluation of their oral health status. Clinical indicators such as Index of treatment need (IOTN) cannot describe the satisfaction of patients seeking treatment. Oral health-related quality
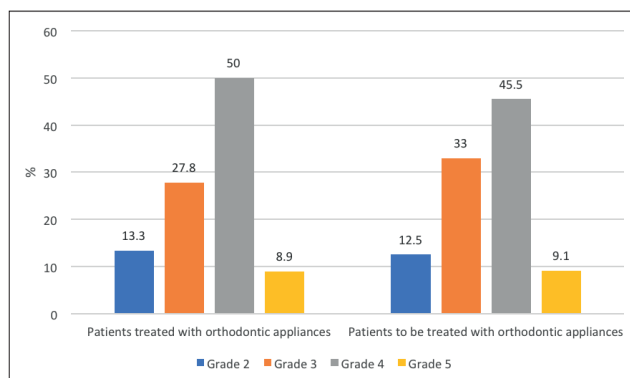
Figure 1. Comparison of IOTN between the experimental and control group
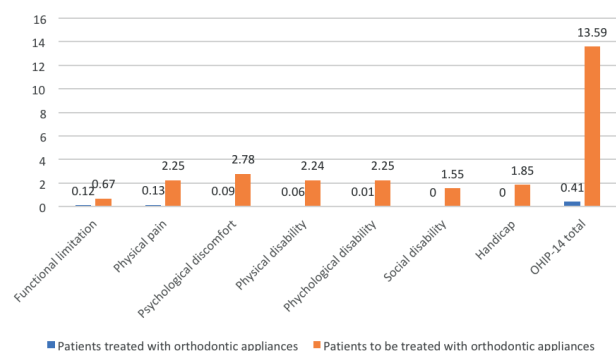

Figure 2. Comparison of OHIP-14 score between the subjects who received and who had not received treatment
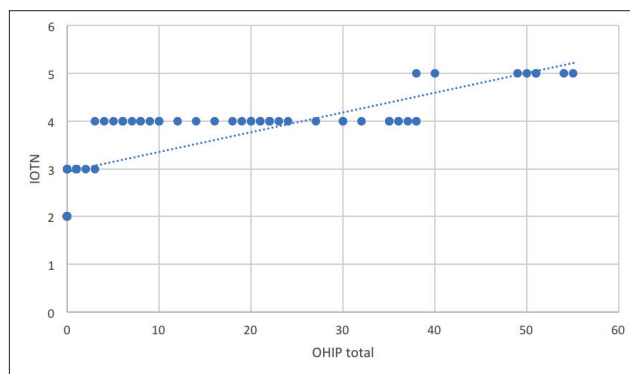

Figure 3. Correlation of IOTN and OHIP-14 results in control group

of life (OHRQOL) is considered to be the best measurement for orthodontic treatment need and should be a part of the evaluation of oral health status in orthodontic patients (11, 12). High prevalence of malocclusion and dental deformities in population can have a negative impact on physical, social and psychological functioning of the individuals (2, 3). With treatment of malocclusion it is possible to improve function, facial appearance and dental aesthetics. Patient's reported motivation to seek a treatment are commonly related to functional and aesthetic reasons, or to self esteem and self-confidence, although the percentages of patients reporting these motives have a great variation in different studies (20, 21, 22). The present study assessed the quality of life as related to the oral health (OHQoL), among the patients who had received and those who wished to receive fixed orthodontic treatment. In our study, it was found that patients who received orthodontic treatment had significantly

improved oral health-related quality of life (OHRQoL). Our study was in consistence with study of Palomares et al. who found that adults who had completed orthodontic treatment and were in the retention phase of treatment, had better OHRQoL than non-treated subjects who were waiting for treatment (23). Chen et al. who followed 250 Chinese orthodontic patients showed that their OHQoL was better after they completed treatment than before or during orthodontic treatment.(24). Bernabe at al. in their study concluded that Brazilian adolescents who had undergone orthodontic treatment had less physical, psychological, and social complications associated with malocclusion in comparison with those who had no history of orthodontics (25). On the contrary, Taylor et al. in their investigation didn't find any significant relationship between the orthodontic treatment and changes in the quality of life (15). A systematic review by Dimberg L et al. indicate that malocclusions basically have negative effects on OHRQoL, in the dimensions of emotional and social well being (26). In comprehensive systematic review and meta-analysis Andiappan M et al. reported that individuals who received treatment for malocclusion and individuals who didn't have need for orthodontic treatment had significantly lower OHIP-14 scores, compared to those who needed orthodontic treatment (27). Also, previous studies reported that OHRQoL can be deteriorated, with the increase in severity of malocclusion (28, 29, 30). The greatest improvement of oral health quality of life (OHQoL) was observed in patients who needed treatment that combines orthodontics and orthognathic surgery (31, 32, 33). In our study, in control group (subjects waiting for orthodontic treatment) the highest score on the OHIP-14 scale, had the patients with high treatment need, according to IOTN. Majority of these patients comprised of those who needed combined orthodontic-surgical approach and of patients with signs and symptoms of TMD. The findings of this study agreed with previous studies reporting that malocclusion can cause pain indirectly, by leading to temporomandibular disorders (34, 35). In the study, high correlation between all domains and the total OHIP-14 and the IOTN score in both groups, showed that IOTN truly reflected the QoL measured by the OHIP-14 questionnaire. Although, all domains of OHRQoL were affected, the most significantly affected domains were psychological discomfort, psychological disability and physical pain. Similar to our study, Chen M et al. reported that malocclusion had a significantly negative impact on OHRQoL and that mostly affected domains were psychological discomfort and psychological disability (24). Previous studies also, indicate a strong association between malocclusion and psychological discomfort and disability (36, 37, 38). These findings support the assumption that with correction of orofacial deformities and improvement of patient's oral function and aesthetics, we consequently exert positive effect on patient's psychological and social well-being. Correction of dental malocclusion improves oral health-related quality of life in general. This study has shown that subjects who were waiting for orthodontic treatment had more negative OHRQoL of life, than

subjects who received orthodontic treatment. Based on study results, it can be concluded that an OHRQoL is very useful tool for assessment of orthodontic treatment needs and consequent improvement of quality of life.

Limitations: One of the limitations was that were no pretreatment assessment of OHRQoL of treated patients and also the study should be done on overall population, so we can exclude possible bias. Also, sample size was limited, and in future individuals with larger sample are needed to undeceive the correlation between malocclusion and treatment needs.

6. CONCLUSION

Malocclusion has a significant negative impact on OHRQoL and its domains. Subjects with no history of orthodontic treatment had significantly worse OHIP-14 score, than subjects who had completed orthodontic treatment. There was significant association between mean overall OHIP- 14 score and high orthodontic treatment need (Grade 4 and 5) in non-treated group.

Author's contribution: Each author gave substantial contribution to the conception or design of the work and in the acquisition, analysis and interpretation of data for the work. Each author had role in drafting the work and revising it critically for important intellectual content. Each author gave final approval of the version to be published and they agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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