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Original Article

Impact of Orthodontic Treatment on Oral Health-Related Quality of Life in the Slovak Republic: A Cross-Sectional Study

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Abstract

Objective: To determine the level of Oral Health-related Quality of Life satisfaction in orthodontic patients compared with the control group. **Material and Methods:** In this cross-sectional study, the standardized questionnaire "Oral Health-related Quality of Life" (OHRQoL) was used. The 37 statements in the questionnaire are divided into four subscales; the total satisfaction score has been evaluated as well. 146 orthodontic patients (42.5% men) aged 8-72 years were divided into four subgroups: (i) patients treated by dental crowns and implants (DCI), (ii) subjects with dental prosthesis (DP), (iii) patients treated by dental braces (DB), and (iv) patients treated by dental retainer (DR). The control group consisted of 49 dental patients without any orthodontic treatment (51.0% men in mean age 20.0 ± 8.2 years). Mean scores and levels of satisfaction (%) were evaluated in all subgroups and in all subscales. **Results:** The lowest rate of patients OHRQoL satisfaction was observed in the DP subgroup; the highest satisfaction level was found in the DCI subgroup. The highest rate of patient OHRQoL satisfaction in the study group was observed in subscales social well-being and functional limitation, and the highest level of dissatisfaction in a subscale emotional well-being. High significant differences between study and control groups were found in terms of a higher satisfaction level in a control group. **Conclusion:** The most dissatisfied were the oldest patients with dental prosthesis with the highest level of dissatisfaction in the emotional well-being subscale.

Keywords: Orthodontics; Quality of Life; Oral Health.

Introduction

Over the past two decades, an increasing body of research has been devoted to exploring the links between oral diseases and quality of life outcomes [1]. Recently, the impact of oral health and disease [2], dental appearance, malocclusion, and treatment for these conditions on psychological and functional well-being has drawn increasing attention from clinicians and researchers [3].

Quality of life (QoL) is characterized as a "sense of well-being derived from satisfaction or dissatisfaction with areas of life considered important for an individual" [4-5]. Quality of life is influenced by a wide range of different factors [6-8]. It was established as an important factor in evaluating the impact of a disease and efficacy of different treatments and related factors [9]. Quality of life is an important endpoint in assessing long-term results of intensive care [10]. Different levels of oral health have different effects on the QoL, since clinical indicators are often mediated and modified by functional and experiential factors such as mastication ability and pain, and by sociodemographic, cultural, economic, and psychological factors [11].

Oral health-related quality of life (OHRQoL) has been defined as an individual's perception of how functional, psychological, and social aspects, together with pain and discomfort, affect personal well-being. Accordingly, OHRQoL has been described as a multidimensional concept including subjective evaluations of own oral health, as well as expectations of and satisfaction with dental care [12]. Despite its relatively recent emergence over the past few decades, OHRQoL has important implications for the clinical practice of dentistry and dental research [13]. The concept of OHRQoL is significant to three areas of dental health in particular; these are the clinical practice of dentistry, dental research and dental education [14].

Several measures of OHRQoL have been developed for adult populations. Most of these grew out of studies that focused on the impact of caries, periodontal disease, and tooth loss and replacement among older adults. These include the General (formerly Geriatric) Oral Health Assessment Index and the Oral Health Impact Profile [3]. The importance of subjective measures of oral health is well recognized in dental research [15]. Patient-centered evaluation of the outcome of therapy is attracting growing interest [16].

Although studies generally report an association between malocclusion/orthodontic treatment need and OHRQoL scores, the strength of evidence is relatively low, and there is a need for using standardized methods to enhance comparability [17]. Malocclusion is often conspicuous, so it might lead to adverse social reactions and a deficient self-concept. Correction of the malocclusion has been shown to improve body image of dental and facial features [18].

Oral health changes, such as tooth loss can have a profound effect on a patient's quality of life. The partial and fully edentulous condition has negative impacts on ability to chew, speech and appearance. When planning treatment, it should be kept in mind that the pain and physical discomfort domains of the individual subscales are of primary importance to the patients [19]. Despite declining edentulism and increasing implant treatment, the need for complete denture treatment will remain substantial in the future. Although implant-supported dentures can

substantially improve the quality of life, in particular for patients unable to adapt to dentures, for most edentulous patients complete dentures will remain the only treatment option [16]. Dental implants support either a fixed or a removable prosthesis and can provide a significant benefit to partially or fully edentulous patients [20]. The success or failure of oral treatment using conventional dentures depends on many factors, including the practitioner's technical skills and unfavorable oral conditions [21].

The aim of the study is to determine the level of OHRQoL satisfaction/dissatisfaction in terms of oral symptoms, functional limitations, emotional well-being and social well-being, and the total level of OHRQoL satisfaction/dissatisfaction as well in four groups of orthodontic patients compared with the control group.

Material and Methods

Study Design

In this cross-sectional study, the standardized questionnaire "Oral Health-related Quality of Life" (OHRQoL) was used [22]. The questionnaire itself was preceded by several questions regarding basic demographic data (age, gender, education, employment status and a place of residence).

The OHRQoL questionnaire consists of 37 statements focusing on oral health-related quality of life. The statements are divided into the following groups: oral symptoms (6 questions), functional limitations (9 questions), emotional well-being (9 questions), social well-being (13 questions), and total scale (all 37 questions). Respondents are asked how frequently they have experienced a particular problem in the previous month. Responses are rated on a Likert-type scale (0 – never, 1 – hardly ever, 2 – occasionally, 3 – fairly often, 4 – very often), where a high score means a high impairment of OHRQoL (range of total score 0–148). Patient's satisfaction was assessed as follow: 0 = the highest OHRQoL satisfaction, 4 = the highest OHRQoL dissatisfaction. The mean scores in all subgroups and in all subscales as well as the mean total score were calculated. The level of the OHRQoL satisfaction was also expressed as a percentage, as follows:

$$100\% - (\text{actual score} / \text{maximum possible score} * 100\%) - \text{Higher percentage suggests a higher level of the OHRQoL satisfaction.}$$

Data Collection

The study sample was recruited from the patients attending dental surgeries in the Slovak capital as well as in several small towns in western and eastern Slovakia regions. Incomplete questionnaires were rejected. In total, 195 completed questionnaires were collected; the response rate was 90%. Parents completed a questionnaire instead of underage respondents. The questionnaire was anonymous and a privacy policy was respected, participation in the study was voluntary.

The study sample (n=146) was divided into four subgroups: (i) patients treated by Dental Crowns and Implants (DCI); (ii) subjects with Dental Prosthesis (DP); (iii) patients treated by Dental Braces (DB) and (iv) patients treated by Dental Retainer (DR). The control group consisted of dental patients who have not been treated by any of above-mentioned orthodontic methods.

Statistical Analysis

The data were analyzed by the statistical program SPSS. Descriptive statistics (percentages, averages, standard deviations) were used. A two-sample t-test was used to compare the mean scores of the OHRQoL satisfaction between study and control groups. An ANOVA test was used to compare the mean scores of OHRQoL satisfaction among subgroups in each subscale. The statistically significant level was determined at P values <0.05.

Ethical Aspects

All participants (and parents of underage participants) signed informed approval with their participating in the study. This study was approved by the University Hospital Ethics Committee of the Faculty of Medicine in Bratislava in accordance with Helsinki Declaration and guidelines.

Results

The basic characteristics of the sample are presented in Table 1 and included: (i) Dental Crowns and Implants (DCI) (n=20, 40.0% of males; mean age 42.3 ± 15.6 years); (ii) Dental Prosthesis (DP) (n=25, 24.0% of males; mean age 60.6 ± 8.4 years), (iii) Dental Braces (DB) (n=82, 47.6% of males; mean age 15.5 ± 4.4 years), and (iv) Dental Retainer (DR) (n=19, 47.4% of males; mean age 20.2 ± 3.0 years). The control group had 49 subjects (51.0% of males; mean age 20.0 ± 8.2 years).

Table 1. Basic characteristics of the sample (n=195).

Variables		Study group	Subgroups				Control group
		(n = 146)	DCI	DP	DB	DR	(n = 49)
		n (%)	(n = 20) n (%)	(n = 25) n (%)	(n = 82) n (%)	(n = 19) n (%)	n (%)
Gender	Male	62 (42.5)	8 (40.0)	6 (24.0)	39 (47.6)	9 (47.4)	25 (51.0)
	Female	84 (57.5)	12 (60.0)	19 (76.0)	43 (52.4)	10 (52.6)	24 (49.0)
Age [years]	Mean ($\bar{x} \pm SD$)	27.5 ± 19.1	42.3 ± 15.6	60.6 ± 8.4	15.5 ± 4.4	20.2 ± 3.0	20.0 ± 8.2
	< 20	73 (50.0)	-	-	66 (80.5)	7 (36.8)	24 (48.9)
	20–35	37 (25.3)	9 (45)	-	16 (19.5)	12 (63.2)	22 (44.9)
	36–49	7 (4.8)	2 (10)	5 (20.0)	-	-	3 (6.2)
	≥ 50	29 (19.9)	9 (45)	20 (80.0)	-	-	-
Occupation	Student	63 (43.3)	3 (15.0)	-	57 (69.5)	3 (15.7)	24 (49.0)
	Employed	51 (34.9)	11 (55.0)	9 (36.0)	19 (23.2)	12 (63.2)	18 (37.0)
	Unemployed	16 (10.9)	2 (10.0)	4 (16.0)	6 (7.3)	4 (21.1)	7 (14.0)
	Other	16 (10.9)	4 (20.2)	12 (48.0)	-	-	-
Education level	Incomplete elementary	49 (33.6)	1 (5.0)	1 (4.0)	47 (57.3)	-	21 (42.8)
	Elementary	20 (13.7)	4 (20.0)	6 (24.0)	10 (12.4)	-	6 (12.3)
	Secondary	53 (36.3)	10 (50.0)	6 (24.0)	21 (25.7)	16 (84.2)	22 (44.9)
	University	24 (16.4)	5 (25.0)	12 (48.0)	4 (4.9)	3 (15.8)	-
Place of residence	Urban	95 (65.1)	19 (95.0)	17 (68.0)	43 (52.4)	16 (84.2)	41 (83.7)
	Rural	51 (34.9)	1 (5.0)	8 (32.0)	39 (47.6)	3 (15.8)	8 (16.3)

Mean scores in all subgroups and in all subscales of OHRQoL satisfaction are presented in Table 2. The lowest level of the OHRQoL satisfaction showed DP subgroup in all subscales (within the range 51.3%-64.3%) as well as in the total scale (58.3%) with the maximum dissatisfaction in the subscale emotional well-being (1.95 ± 0.36 ; 51.3%). On the other hand, the highest level of the OHRQoL satisfaction (i.e. the lowest mean score and/or the highest percentage) was found in the DCI subgroup in all subscales (as well as in the total scale), except oral symptoms, where the highest satisfaction showed the DR subgroup.

In the DCI subgroup, the highest rate of patients OHRQoL dissatisfaction was observed in the subscale oral symptoms (1.24 ± 0.54 ; 69%) and the highest rate of satisfaction in the subscale social well-being (0.90 ± 0.26 ; 77.50%). The highest rates of the OHRQoL dissatisfaction in the DB and DR subgroups were found in the subscale emotional well-being (1.46 ± 0.45 ; 63.5% and 1.39 ± 0.36 ; 65.3%, respectively), and the most satisfied patients in these subgroups were in the subscales functional limitations (1.14 ± 0.45 ; 71.5%) and social well-being (1.14 ± 0.38 ; 71.5%), respectively.

The highest total rate of patients OHRQoL dissatisfaction was observed in the DP subgroup (1.67 ± 0.20 ; 58.3%), the highest level of satisfaction was found in the DCI subgroup (1.12 ± 0.21 ; 72.0%).

Differences in patients OHRQoL satisfaction among particular subgroups were statistically significant in the subscales functional limitations, emotional well-being, social well-being, as well as in the overall scale. The high significant differences in the mean scores of OHRQoL dissatisfaction between study subgroups and control group were found in the majority of cases, apart from not significant difference between DCI subgroup and control group in the social well-being subscale (Table 2).

Table 2. Mean scores and levels of the OHRQoL satisfaction (%) in all subscales and all subgroups.

Subscales	Sub group	Study group (n=146)			Control group (n=49)		
		Mean score x (SD)	P ₁	Level of satisfaction (%)	Mean score x (SD)	Level of satisfaction (%)	P ₂
Oral symptoms	DCI	1.24 (0.54)	0.102	69.0	0.82 (0.28)	79.5	0.001
	DP	1.56 (0.32)		61.0			0.000
	DB	1.32 (0.51)		67.0			0.000
	DR	1.23 (0.42)		69.3			0.001
Functional limitations	DCI	1.07 (0.34)	0.000	73.3	0.88 (0.30)	78.0	0.033
	DP	1.73 (0.39)		56.8			0.000
	DB	1.14 (0.45)		71.5			0.000
	DR	1.32 (0.21)		67.0			0.000
Emotional well-being	DCI	1.14 (0.30)	0.000	71.5	0.88 (0.29)	78.0	0.003
	DP	1.95 (0.36)		51.3			0.000
	DB	1.46 (0.45)		63.5			0.000
	DR	1.39 (0.36)		65.3			0.000
Social well-being	DCI	0.90 (0.26)	0.000	77.5	0.85 (0.28)	78.8	0.530
	DP	1.43 (0.32)		64.3			0.000
	DB	1.23 (0.43)		69.3			0.000
	DR	1.14 (0.38)		71.5			0.006
Total scale	DCI	1.12 (0.21)	0.000	72.0	0.86 (0.17)	78.5	0.000
	DP	1.67 (0.20)		58.3			0.000
	DB	1.29 (0.29)		67.8			0.000
	DR	1.27 (0.25)		68.3			0.000

Statistical significance among subgroups within each subscale by ANOVA (P₁). Statistical significance between study subgroups and a control group by t-test (P₂).

Mean scores, levels of satisfaction (%) in all subscales of the OHRQoL satisfaction as well as the comparison between study and control groups are presented in Table 3. The highest rate of patients OHRQoL satisfaction in the study group was observed in subscales social well-being (1.21 ± 0.41 ; 69.8%) and functional limitation (1.26 ± 0.46 ; 68.5%), and the highest level of dissatisfaction in a subscale emotional well-being (1.49 ± 0.47 ; 62.8%). High significant differences between study and control groups were found.

Table 3. Mean scores and levels of OHRQoL satisfaction (%) in each subscale, and statistical differences (P) between the study (n=146) and the control (n=49) groups.

Subscales	Group	Mean score x (SD)	Level of satisfaction (%)	P
Oral symptoms	Study	1.35 (0.48)	66.3	0.000
	Control	0.82 (0.28)	79.5	
Functional limitations	Study	1.26 (0.46)	68.5	0.000
	Control	0.88 (0.30)	78.0	
Emotional well-being	Study	1.49 (0.47)	62.8	0.000
	Control	0.88 (0.29)	78.0	
Social well-being	Study	1.21 (0.41)	69.8	0.000
	Control	0.85 (0.28)	78.8	
Total scale	Study	1.33 (0.31)	66.8	0.000
	Control	0.86 (0.17)	78.5	

Discussion

Quality of life is affected by oral health in the majority of population [23]. Consequently, physical pain and psychological status related to oral condition were most frequently reported to affect adult lives [24].

The low number of available studies dealing with the impact of dental implants, braces, prosthesis and dental retainers' treatment on patients' quality of life using the same kind of questionnaire (OHRQoL) with 37 statements can be found in the scientific sources.

The highest level of satisfaction with OHRQoL in the DCI subgroup was found in the social well-being subscale. In our opinion, this is because the dental crowns and implants do not interfere with communication and/or with work. The highest OHRQoL dissatisfaction observed in the oral symptoms subscale could be partly explained by food being stuck between the teeth, which can make halitosis. It is well known that dental implants should be employed only after the cessation of skeletal growth, that is to say, mostly in adult patients [25].

A previous study reviewed the impact of prosthodontic and dental implant treatment on patients OHRQoL satisfaction, but concluded that very little is known about other indications than edentulism in implantology [26]. Fully edentulous patients experience negative impacts on OHRQoL due to their condition and benefit significantly from the use of dental implants to support mandibular prostheses. However, support by more than two implants does not appear further significantly increasing of patient's OHRQoL satisfaction [25].

The impact of tooth loss on OHRQoL could be affected either by the number of missed teeth or by the location of these losses. In addition, the substitution of these losses with dental prosthesis could have a positive effect on individual's life, which varies depending on the type of prosthesis and the duration of the rehabilitation.

A few population-based studies have addressed the impact of use and need of dental prosthesis. The negative impact of poor oral conditions on the quality of life of adults and the elderly is an important public health issue, which must be addressed by policy-makers, especially in low and middle-income countries, where the demographic shifts are really fast [27].

Inappropriate treatment of edentulism using total prostheses may lead to not only impaired buccal function and increased alveolar bone loss, but it also increases patient self-consciousness. Assessment of rehabilitation treatments must consider patients' opinions as a variable of treatment success. Patients often express dissatisfaction with their lower arch dentures, and complaints include reduced retention stability of conventional dentures, and difficulties with mastication and verbal communication, all due to bone resorption of the alveolar process with time [28].

The highest OHRQoL dissatisfaction in our DP subgroup was observed in the emotional well-being subscale. This may be related to the fact that patients with DP formed the oldest age group, which can be characterized by the highest rates of comorbidity, depression and loneliness. Most studies did not discriminate DP location, although different arch's location can present different retention, stability, acceptance and adaptation degrees. Some authors evaluated OHRQoL in a sample of DP wearers by two different questionnaires [29] and found a higher score in the DP patients in the functional limitation subscale, but this subscale showed difference in different kinds of prosthesis. They concluded that the level of impairment in the lower arch was higher than in the upper arch for complete denture wearers irrespective of the questionnaire used. Unfortunately, data in literature assessing different location of DP are scarce or lacking.

Fixed orthodontic appliance therapy is a regular orthodontic treatment to correct variations from an arbitrary norm (align the teeth or correct other irregularities), which may cause functional restrictions, discomfort and pain. Although many specific OHRQoL measures have been developed to analyze the impact of wearing a fixed appliance, there is still a paucity of systematic appraisal of the consequences of orthodontics on quality of life. Patients' OHRQoL was better after they completed orthodontic treatment than it was before or during treatment [30].

Fixed orthodontic treatment is not without side effects: pain from teeth, ulceration and soreness and negative impact on daily living and quality of life [31]. Previous studies have found that the severity of malocclusion and aesthetic impairment was higher in adolescents with orthodontic treatment, resulting in a worse QoL score compared with the age-matched peers who were not seeking orthodontic treatment [32]. In our DB subgroup was found a higher dissatisfaction with OHRQoL in oral symptoms subscale than in the DCI subgroup. It is probably because patients with dental braces are more limited when eating meals and ashamed to smile. A higher OHRQoL satisfaction in this subgroup was observed in the functional limitations subscale.

Today technology and materials from which dental braces are produced probably don't make any patients' limitations.

Retention is the phase of orthodontic treatment that attempts to keep teeth in the corrected positions after orthodontic (dental) braces. Without a phase of retention, there is a tendency for the teeth to return to their initial position (relapse). To prevent relapse almost every patient who has orthodontic treatment will require some type of retention [33]. Fixed retainers consist of braided or solid metallic wires bonded to enamel with resin composite orthodontic adhesives. In our DR subgroup, the highest rate of patients OHRQoL satisfaction was observed in the social well-being subscale. This can be partly explained by the fact that young people are considering orthodontic retainers for fashion and aesthetic complement. Patients in this subgroup declared also the highest level of OHRQoL satisfaction in the oral symptoms subscale, probably to the use of modern and non-irritant materials of which the retainers are made (e.g. aramid, polyethylene and glass-fibres impregnated with resin).

High significant differences between study and control groups suggest a lower level of patients OHRQoL satisfaction regardless of the orthodontic treatment type. In the future, we will evaluate the OHRQoL satisfaction in patients at different stages of orthodontic treatment with regard the study of Farzanegan et al. [34], in which the patients' QoL level was on the decrease after orthodontic treatment initiating.

A possible limitation of this study is the sample size and its representativeness, which could pose problems in terms of generalizing the results. Limiting is the low number of the control group members and their mean age as well. It is a difficult task to collect dental patients in older age without any orthodontic treatment.

Conclusions

Quality of life is the most commonly used concepts in contemporary medicine and involving many factors. The aim of every orthodontic treatment is to achieve the highest possible level of QoL with the best functional and aesthetic results.

The highest level of OHRQoL dissatisfaction was observed in the emotional limitations subscale while the highest level of satisfaction was found in the social well-being subscale. The lowest rate of OHRQoL satisfaction was assessed in patients with dental prosthesis. The level of satisfaction of total scale was significantly lower in orthodontic patients compared with dental patients without any orthodontic treatment.

Our results are the argument for intervention aimed at prevention of dental caries and improving oral hygiene from early childhood, as well as eliminating factors that are cause of malocclusion (sucking thumb/finger, pacifier sucking, lips sucking and mouth breathing), which will require in the future an orthodontic treatment.

References

1. Locker D. Oral health and quality of life. *Oral Health Prev Dent* 2004; 2(Suppl 1):247-253.
2. Kaminska A, Szalewski L, Batkowska J, Wallner J, Wallner E, Szabelska A, Borowicz J. The dependence of dental caries on oral hygiene habits in preschool children from urban and rural areas in Poland. *Ann Agric Environ Med* 2016; 23(4):660-665. doi: 10.5604/12321966.1226863.
3. Kiyak HA. Does orthodontic treatment affect patients' quality of life? *J Dent Educ* 2008; 72(8):886-894.
4. De Oliveira CM, Sheiham A. Orthodontic treatment and its impact in oral health-related quality of life in Brazilian adolescents. *J Orthod* 2004; 31(1):20-27. doi: 10.1179/146531204225011364.
5. Feu D, Quintão CCA, Miguel JAM. Quality of life instruments and their role in orthodontics. *Dental Press J Orthod* 2010; 15(6):61-70. doi: 10.1590/S2176-94512010000600008.
6. Brajković L, Godan A, Godan L. Quality of life after stroke in old age: comparison of persons living in nursing home and those living in their own home. *Croat Med J* 2009; 50(2):182-188. doi: 10.3325/cmj.2009.50.182.
7. Kozmhinsky VMR, Heimer M, Goes PSA. Sociodemographic factors and oral health conditions related to the impact on the quality of life of adolescents. *Pesqui Bras Odontopediatria Clín Integr* 2016; 16(1):35-42. doi: 10.4034/PBOCI.2016.161.04.
8. Martins LGT, Pereira KCR, Costa SXS, Traebert E, Lunardelli SE, Lunardelli AN, Traebert J. Impact of dental caries on quality of life of school children. *Pesqui Bras Odontopediatria Clín Integr* 2016; 16(1):307-312. doi: 10.4034/PBOCI.2016.161.32.
9. Zaletel-Kragelj L, Erzen I, Fras Z. Interregional differences in health in Slovenia. I. Estimated prevalence of selected cardiovascular and related diseases. *Croat Med J* 2004; 45(5):637-643.
10. Fildissis G, Zidianakis V, Tsigou E, Koulenti D, Katostaras T, Economou A, Baltopoulos G. Quality of life outcome of critical care survivors eighteen months after discharge from intensive care. *Croat Med J* 2007; 48(6):814-21.
11. Spalj S, Peric D, Mlacovic Zrinski M, Bulj M, Plancak D. Predictive value of dental readiness and psychological dimensions for oral health-related quality of life in Croatian soldiers: a cross-sectional study. *Croat Med J* 2012; 53(5):461-9.
12. Johansson G, Östberg AL. Oral health-related quality of life in Swedish young adults. *Int J Qual Stud Health Well-being* 2015; 10:27125. doi: 10.3402/qhw.v10.27125.
13. Sischo L, Broder HL. Oral health-related quality of life: what, why, how, and future implications. *J Dent Res* 2011; 90(11):1264-70. doi: 10.1177/0022034511399918.
14. Gift HC, Atchison KA, Dayton CM. Conceptualizing oral health and oral health-related quality of life. *Soc Sci Med* 1997; 44(5):601-8.
15. Divaris K, Lee JY, Baker AD, Vann WF. The relationship of oral health literacy with oral health-related quality of life in a multi-racial sample of low-income female caregivers. *Health Qual Life Outcomes* 2011; 9:108. doi: 10.1186/1477-7525-9-108.
16. Stober T, Danner D, Lehmann F, Séché AC, Rammelsberg P, Hassel AJ. Association between patient satisfaction with complete dentures and oral health-related quality of life: two-year longitudinal assessment. *Clin Oral Investig* 2012; 16(1):313-8. doi: 10.1007/s00784-010-0483-x.
17. Zhang M, McGrath C, Hagg U. The impact of malocclusion and its treatment on quality of life: a literature review. *Int J Paediatr Dent* 2006; 16(6):381-7.
18. Kiyak H, Reichmuth M. Body image issues in dental medicine. In: Cash TF, Pruzinsky T (Ed.). *Body Image: A Handbook of Theory, Research, and Clinical Practice*. New York: Guilford Publications; 2004. p. 342-350.
19. Eltas A, Uslu MO, Eltas SD. Association of oral health-related quality of life with periodontal status and treatment needs. *Oral Health Prev Dent* 2016; 14(4):339-47. doi: 10.3290/j.ohpd.a35613.
20. Patel N, Vijayanarayana RP, Pachter D, Coulthard P. Oral health-related quality of life: pre- and post-dental implant treatment. *Oral Surgery* 2015; 8(1):18-22. doi: 10.1111/ors.12106.
21. Fillion M, Aubazac D, Bessadet M, Allègre M, Nicolas E. The impact of implant treatment on oral health related quality of life in a private dental practice: a prospective cohort study. *Health Qual Life Outcomes* 2013; 11:197. doi: 10.1186/1477-7525-11-197.
22. Jokovic A, Locker D, Tompson B, Guyatt G. Questionnaire for measuring oral health-related quality of life in eight- to ten-year-old children. *Pediatr Dent* 2004; 26(6):512-8.
23. Smith B, Baysan A, Fenlon M. Association between Oral Health Impact Profile and General Health scores for patients seeking dental implants. *J Dent* 2009; 37(5):357-9. doi: 10.1016/j.jdent.2009.01.004.

24. Nuttall NM, Slade GD, Sanders AE, Steele JG, Allen PF, Lahti S. An empirically derived population-response model of the short form of the Oral Health Impact Profile. *Community Dent Oral Epidemiol* 2006; 34(1):18-24. doi: 10.1111/j.1600-0528.2006.00262.x.
25. Kriz P, Seydlova M, Dostalova T, Valenta Z, Chleborad K, Zvarova J, Feberova J, et al. Oral health-related quality of life and dental implants – preliminary study. *Cent Eur J Med* 2012; 7(2):209-15.
26. Strassburger C, Kerschbaum T, Heydecke G. Influence of implant and conventional prostheses on satisfaction and quality of life: A literature review. Part 2: Qualitative analysis and evaluation of studies. *Int J Prosthodont* 2006; 19(4):339-48.
27. Azevedo MS, Correa MB, Azevedo JS, Demarco FF. Dental prosthesis use and/or need impacting the oral health-related quality of life in Brazilian adults and elders: Results from a National Survey. *J Dent* 2015; 43(12):1436-41. doi: 10.1016/j.jdent.2015.10.016.
28. Zani SR, Rivaldo EG, Frasca LC, Caye LF. Oral health impact profile and prosthetic condition in edentulous patients rehabilitated with implant-supported overdentures and fixed prostheses. *J Oral Sci* 2009; 51(4):535-43.
29. Mesko ME, Patias R, Pereira-Cenci T. Is OHIP-EDENT similar to GOHAI when measuring OHRQoL in partial and complete denture wearers? *Dentistry* 2013; 3:160. doi: 10.4172/2161-1122.1000160.
30. Liu Z, McGrath C, Hägg U. The impact of malocclusion/orthodontic treatment need on the quality of life. A systematic review. *Angle Orthod* 2009; 79(3):585-91. doi: 10.2319/042108-224.1.
31. Johal A, Abed Al Jawad F, Marcenes W, Croft N. Does orthodontic treatment harm children's diets? *J Dent* 2013; 41(11):949-54. doi: 10.1016/j.jdent.2013.08.025.
32. Wang J, Tang X, Shen Y, Shang G, Fang L, Wang R, Xu Y. The correlations between health-related quality of life changes and pain and anxiety in orthodontic patients in the initial stage of treatment. *BioMed Res Int* 2015;725913. doi: 10.1155/2015/725913.
33. Littlewood SJ, Millett DT, Doubleday B, Bearn DR, Worthington HV. Retention procedures for stabilising tooth position after treatment with orthodontic braces. *Cochrane Database Syst Rev* 2016; (1):CD002283. doi: 10.1002/14651858.CD002283.pub4.
34. Farzanegan F, Heravi F, Ramezani M. Evaluation of health related quality of life changes after initial orthodontic treatment. *Oral Health Prev Dent* 2015; 13(2):143-7. doi: 10.3290/j.ohpd.a33087.