Comparison of oral-health-related quality of life during treatment with headgear and functional appliances

SHADI KADKHODA¹, SAHARNAZ NEDJAT² & MOHSEN SHIRAZI³

¹School of Dentistry, Tehran University of Medical Sciences, Tehran, Iran, ²Knowledge Utilization Research Center, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran, and ³Department of Orthodontics and Dental Research Center, School of Dentistry, Tehran University of Medical Sciences, Tehran, Iran

International Journal of Paediatric Dentistry 2011; 21: 369–373

Background. Functional and headgear are two well-known approaches in the treatment of skeletal class II malocclusion in preadolescent children. Assessment of psycho-social impacts of wearing devices during the treatment period is central to enhancing the quality of healthcare services.

Aim. This study aimed to compare oral-healthrelated quality of life in two groups consisting of children wearing headgear or functional appliances. We also compared these groups with a non-malocclusion group.

Design. The study population consisted of 187, 11- to 14-year-old children in three groups of

Introduction

In recent years, there has been increasing attention towards measuring the patients' perspectives of their oral health status. Assessing patients' health-related quality of life, in particular oral-health-related quality of life (OHQoL), is important because it can improve doctor-patient interactions, evaluates patient satisfaction with treatment and provides data for the future financing healthcare services^{1,2}.

Headgear and functional devices, as two well-known approaches in the treatment of skeletal class II malocclusion in preadolescent children, have been an area for research for several years^{3–7}. Although there are several

Correspondence to:

functional (n = 67), headgear (n = 67) and nonmalocclusion (n = 53). Children were asked to complete the translated version of the short form of the Child Perceptions Questionnaire. Total scores and subscale scores of the three clinical groups were compared through ANOVA.

Results. There was no significant difference in mean total scale score and subscale scores between functional and headgear groups (P > 0.05). Significant differences were found in both mean total and subscale scores between the malocclusion and nonmalocclusion groups (P < 0.001) except oral symptoms subscale (P > 0.05). **Conclusions.** The results of this study reveal that functional and headgear appliances do not differ in terms of impact on daily life during the treatment. Moreover, both groups have poorer OHQoL compared to malocclusion group.

studies dealing with the technical-clinical aspects of the functional and headgear therapy, a few publications have appeared concerning the psycho-social impacts of the treatment process on daily life^{8,9}.

Given the fact that integration of the OHQoL concept into clinical practice of dentistry would be useful for improving the outcome of healthcare services¹⁰, this study was designed to address the question: 'How are functional and headgear therapy different when it comes to child's quality of life'? To answer this question, we chose to use the translated Persian version of the regression short form of the Child Perceptions Questionnaire for 11-14-year-old children (CPQ11-14-RSF:8). The 37-item questionnaire was first developed by Jokovic et al.11 in Canada, which has been validated and cross-culturally adapted in different countries^{12–17}. Jokovic et al., using the impact item and regression methods, later developed short versions of the

Mohsen Shirazi, Department of Orthodontics and Dental Research Center, School of Dentistry, Tehran University of Medical Sciences, Kargar Shomali St., Hakim Hwy, P.O. Box: 14395-433, Tehran 1439955991, Iran. E-mail: shirazi_m@tums.ac.ir

CPQ_{11–14} referred to as CPQ_{11–14}-ISF:8 (impact short-form), CPQ_{11–14}-ISF:16, CPQ_{11–14}-RSF:8 and CPQ_{11–14}-RSF:16, which showed to have substantial validity^{18,19}. In this study, we aimed to compare the OHQoL in three groups of preadolescent children by the means of translated version of the CPQ_{11–14}-RSF:8.

Material and methods

The questionnaire

The CPQ₁₁₋₁₄-RSF:8 consists of eight questions encompassing four domains with two questions in each one: oral symptoms; bad breath and mouth sores, functional limitations; difficulty saving words and trouble sleeping, emotional well-being; concerned what people think about him/her and being upset, social well-being; teased or called names and argued with children/family¹⁸. The children were asked about the frequency of the each problem in the past 3 months. Responses were measured on a Likert Scale as 0 (never), 1 (once/twice), 2 (sometimes), 3 (often) and 4 (everyday/almost everyday). Total scores were calculated by summing up the item scores ranging from 0 to 32; whereby, a higher score represents a poorer oral health quality of life.

Adaptation and translation of the CPQ₁₁₋₁₄-RSF:8

The English version of the CPQ_{11-14} -RSF:8 underwent a forward–backward translation process conducted by two independent bilingual translators. In each step, the questionnaire was discussed in an expert panel consisting of a professor of orthodontics, methodologist and a third translator. Except minor discrepancies, the Persian version of the CPQ_{11-14} -RSF:8 was approved to be used.

Study population

A total of 187 children, aged 11–14 years old, participated in this study. The study was performed on three groups of children: Group 1) children wearing twin block functional appliances (n = 67), Group 2) children wearing headgears (n = 67), and Group 3) children

without malocclusion (n = 53). DMFT index was equal or lower than two in all groups. The first two groups were recruited from patients referred to dental faculty at Tehran University of Medical Sciences, public orthodontic clinics in Qom and Kashan (two other Iranian cities) and private orthodontic clinics in Tehran. The nonmalocclusion group was selected among fifth-grade students from two public elementary schools in Tehran, who all underwent a dental examination given by a trained examiner calibrated in the use of diagnostic criteria. All groups were examined by the same individual.

Children were asked to complete the questionnaires themselves; to remove possible parental influence, the examiner helped the children if they had any reading difficulties in the questions asked. For the retest study, a proportion of the participants from each group (n = 34) completed the questionnaire for a second time 2 weeks after completing the initial questionnaire. Exclusion criteria in this group were those whose oral health condition had changed during this period, such as those who had undergone dental treatment and those who had not used or had broken their appliances.

Ethical consideration

This study underwent ethical review and was approved by the Office of the Vice Chancellor for Research, Tehran University of Medical Sciences. Informed verbal consents were obtained from both the participants and their parents.

Analysis

Reliability was assessed by testing the internal consistency and test–retest reliability. Internal consistency was evaluated using Cronbach's alpha. Alpha was also calculated with each item deleted. A value ≥ 0.7 was considered satisfactory^{20,21}. Test–retest reliability was assessed using the intraclass correlation coefficient (ICC), with a 95% confidence interval.

Chi-square and ANOVA were used to compare demographic factors such as sex, parents' marital status, parents' level of education and constructed area per capita, as an indicator of socioeconomic status. Total scores and subscale scores of the three clinical groups were compared through ANOVA. Analyses were performed using the SPSS 11.5 software version 8 (SPSS Inc., Chicago, IL, USA). *P* value <0.05 was considered statistically significant.

Results

Questionnaire

The calculated Cronbach's alpha for the questionnaire was 0.71, which indicates satisfactory internal consistency. Cronbach's alpha for the subscales ranged from 0.3 to 0.56. Intraclass correlation coefficient was 0.98 for the total scale and ranged from 0.94 to 0.96 within subscales. They all indicated excellent reproducibility and stability of the instrument.

Study population

In total, 187 children $(12.45 \pm 1.3 \text{ years})$ completed the Persian version of the CPQ₁₁₋₁₄-RSF:8. Of these, 67 (36%) were in the functional group, 67 (36%) were in the head-gear group and 53 (28%) in the nonmaloc-clusion group. There was no significant difference in the distribution of sex, parents'

marital status, parents' level of education and socioeconomic status in the three clinical groups (P > 0.05).

Comparison of the three groups: headgear, functional and nonmalocclusion

The three groups were compared using ANO-VA. The overall mean scores in the functional and headgear groups were significantly higher than the nonmalocclusion group (Table 1, P < 0.001). Statistically significant differences were also obtained for all subscales between the malocclusion and the nonmalocclusion groups except 'oral symptoms' subscale (P > 0.05). Moreover, the overall CPQ and the subscale scores between the functional and the headgear groups showed no significant difference (P > 0.05).

Oral-health-related quality of life score in the two sex groups was examined through *T*-test. There was no significant difference between boys and girls (P > 0.05).

Discussion

The functional and headgear groups showed no significant difference in terms of OHQoL. This confirms the fact that there is hardly clear-cut discrimination between these two alternative treatments when we take

Table 1. Comparison of the total score and subscale scores in the three study groups through ANOVA.

	Functional group		Headgear group		Nonmalocclusion group		
	Mean (±SD)	Range of score	Mean (±SD)	Range of score	Mean (±SD)	Range of score	P value*
Overall quality of life**	6.9 (4.86)	0–22	6.5 (4.13)	0–18	2.2 (1.99)	0–6	<0.001
Oral symptoms***	1.73 (1.44)	0–6	1.86 (1.48)	0–6	1.21 (1.11)	0–4	0.164
Bad breath	1.31 (1.11)	0–4	1.18 (1.00)	0–4	0.77 (1.00)	0–4	
Mouth sore	0.42 (0.82)	0–3	0.60 (0.89)	0–3	0.15 (0.50)	0–2	
Functional limitation***	2.33 (2.00)	0–8	1.93 (2.02)	0–7	0.17 (0.54)	0–2	< 0.001
Difficulty saying words	1.50 (1.30)	0–4	0.58 (1.09)	0–4	0.15 (0.63)	0–4	
Trouble sleeping	0.84 (1.13)	0–4	1.12 (1.28)	0–4	0.19 (0.68)	0–4	
Social well-being***	1.00 (1.57)	0–6	0.82 (1.52)	0–7	0.03 (1.86)	0–1	0.007
Argued with children/family	0.40 (0.78)	0–3	0.48 (1.08)	0–4	0.25 (0.65)	0–4	
Teased/called names	0.60 (1.10)	0–4	0.39 (0.78)	0–3	0.21 (0.45)	0–2	
Emotional well-being***	1.81 (1.85)	0–8	1.86 (2.03)	0–8	0.83 (1.31)	0–6	0.035
Concerned	0.66 (1.00)	0–4	0.61 (1.24)	0–4	0.17 (0.47)	0–2	
Upset	1.15 (1.19)	0–4	0.97 (1.24)	0–4	0.32 (0.75)	0–4	

*ANOVA P value.

**Attainable score is 0-32.

***Attainable score is 0-8.

emotional, social, functional and symptomatic aspects - the four domains of the questionnaire - into consideration. Moreover, similar to other studies^{14,18,19,22,23}, there were obvious differences in the overall CPQ scores and subscale scores between the malocclusion and nonmalocclusion groups indicating higher scores and therefore, poorer OHRQoL in the malocclusion group. This difference is also suggestive of the discriminant validity of the Persian version of the questionnaire. Significant difference was not shown for oral symptoms in the two mentioned categories. Oral symptoms subscale consists of two questions concerning feeling of 'bad breath and mouth sore'. We believe that these are common occurrences in the mixed dentition period. Replacing them with more specific questions that encompass malocclusion and appliance wearing-related symptoms in cases where this questionnaire is used for orthodontic approaches is recommended.

In this study, we chose to use the RSF of the CPQ as its items are more relevant to the symptoms that occur during functional and headgear therapy. Furthermore, the fewer number of items in this questionnaire, in comparison with the original full-length questionnaire, facilitates its use in terms of financial costs of data collection and reducing the time¹⁸.

To our best knowledge, there is no similar study concerning the comparison of OHQoL during the treatment with these two particular approaches of skeletal class II malocclusion. Moreover, the number of papers dealing with the concept of the OHQoL is limited in the Middle East countries as compared to the United States, United Kingdom, Canada or Australia¹⁰. The significance of this study is that it is an integration of the OHQoL concepts into daily clinical practice and can provide a subjective approach in orthodontics treatment plans.

The most challenging problem with this study was finding the malocclusion group samples. To solve this problem, the samples were recruited from both private and governmental sections of the society. A comparison between the socio-demographic characteristics of those recruited from private clinics and those from governmental section, however, did not show significant difference (P > 0.05). This may show the independence of finding with sampling sources.

To reduce random error as much as possible, all children were examined by the same trained examiner. As suggested by an earlier study¹⁴, the examiner helped the children with reading difficulties, which could remove possible parental influence.

The intraclass correlation coefficient of 0.98 confirmed excellent stability of the measure. This was higher than ICC in the original RSF:8, which demonstrated moderate reliability $(0.71)^{18}$ as well as all full-length versions countries^{11,13–15,17}. validated in other Although Cronbach's alpha coefficient for the total score showed adequate homogeneity (0.71), this was not the same for the subscales (0.3-0.56). The authors state that the lower Cronbach's alpha coefficients in subscales is related to the sensitivity of this index to the number of items, and it would not make the questionnaire unacceptable to use as an appropriate instrument for evaluation of OHQoL in children. The finding is also consistent with the findings from an earlier study¹⁹. Cronbach's Lower alpha in short-form questionnaire establishes possible limitations when using them in small-scale cross-sectional studies with low variations in individual's OHROoL²².

This questionnaire has been specifically developed for 11- to 14-year-old children. Categorizing this age range into two sub-groups of 11–12 and 13–14 did not show significant result in terms of overall OHQoL and subscales as well (P > 0.05).

This study exhibited statically no significant difference in terms of OHQoL between the malocclusion groups. This can be interpreted in two ways. One possible description is that there is no significant difference in the two malocclusion groups. Another possible explanation could be because of low power of this study. In other words, this study can be used as a pioneer for further population-based researches that aim to find more concrete results in clinical setting.

In conclusion, children wearing functional or headgear appliances were not statically different in terms of OHQoL. Oral-healthrelated quality of life did differ statically between the malocclusion and nonmalocclusion groups.

What this paper adds

• This paper provides a comparison between OHQoL in children wearing functional and headgear during the treatment period.

Why this paper is important to paediatric dentists

• This study would be of great help to those paediatric dentists interested in evaluation of OHQoL in health-care services and consider oral health status in ortho-dontic interventions.

Acknowledgements

We thank the Deputy of Research of the TUMS for funding this study (contract no. 87-04-69-7518). The authors greatly appreciate Dr Sarmadi's assistance with data collection for this study. We are especially thankful to the late professor, Dr Banafsheh Golestan, who contributed greatly to our study. We will always carry her memory in our minds.

References

- 1 Cunningham SJ, Hunt NP. Quality of life and its importance in orthodontics. *J Orthod* 2001; **28**: 152–158.
- 2 Zhang M, Mc Grath C, Hagg U. Patients' expectations and experiences of fixed orthodontic appliance therapy. Impact on quality of life. *Angle Orthod* 2007; **77**: 318–322.
- 3 Keeling SD, Wheeler TT, King GJ *et al.* Anteroposterior skeletal and dental changes after early class II treatment with bionators and headgear. *Am J Orthod Dentofacial Orthop* 1998; **113**: 40–50.
- 4 Ghafari J, Shofer FS, Jacobsen-Hunt U, Markowitz DL, Laster LL. Headgear versus functional regulator in the early treatment of Class II, Division 1 malocclusion. *Am J Orthod Dentofacial Orthop* 1998; **113**: 51–61.
- 5 Sloss EA, Southard KA, Qian F *et al.* Comparison of soft-tissue profiles after treatment with headgear or Herbst appliance. *Am J Orthod Dentofacial Orthop* 2008; **133**: 509–514.
- 6 Almeida-Pedrin RR, Almeida MR, Almeida RR, Pinzan A, Ferreira FP. Treatment effects of headgear biteplane and bionator appliances. *Am J Orthod Dentofacial Orthop* 2007; **132**: 191–198.

- 7 Tadic N, Woods M. Contemporary Class II orthodontic and orthopaedic treatment: a review. *Aust Dent J* 2007; **52**: 168–174.
- 8 Bernabé E, Sheiham A, de Oliveira CM. Impacts on daily performances related to wearing orthodontic appliances. *Angle Orthod* 2008; **78**: 482–486.
- 9 Sergl HG, Zentner A. A comparative assessment of acceptance of different types of functional appliances. *Eur J Orthod* 1998; **20**: 517–524.
- 10 Al Shamrany M. Oral health-related quality of life: a broader perspective. *East Mediterr Health J* 2006; 12: 894–901.
- Jokovic A, Locker D, Stephens M, Kenny D, Thompson B. Validity and reliability of a questionnaire for measuring child oral-health-related quality of life. *J Dent Res* 2002; 81: 459–463.
- 12 Foster Page LA, Thomson WM, Jokovic A, Locker D. Validation of the Child Perceptions Questionnaire (CPQ₁₁₋₁₄). J Dent Res 2005; 84: 649–652.
- 13 O'Brien K, Wright JL, Conboy F, Macfarlane T, Mandall N. The child perception questionnaire is valid for malocclusions in the United Kingdom. *Am J Orthod Dentofacial Orthop* 2006; **129**: 536–540.
- 14 Brown A, Al-Khayal Z. Validity and reliability of the Arabic translation of the child oral-health-related quality of life questionnaire (CPQ₁₁₋₁₄) in Saudi Arabia. *Int J Paediatr Dent* 2006; **16**: 405–411.
- 15 McGrath C, Pang HN, Lo EC, King NM, Hagg U, Samman N. Translation and evaluation of a Chinese version of the child oral-health-related quality of life measure. *Int J Paediatr Dent* 2008; 18: 267–274.
- 16 Wogelius P, Gjorup H, Haubek D, Lopez R, Poulsen S. Development of Danish version of child oral-health-related quality of life questionnaires (CPQ₈₋₁₀ and CPQ₁₁₋₁₄). *BMC Oral Health* 2009; **9**: 11.
- 17 Goursand D, Paiva SM, Zarzar PM *et al.* Cross-cultural adaptation of the Child Perceptions Questionnaire 11-14 (CPQ₁₁₋₁₄) for the Brazilian Portuguese language. *Health Qual Life Outcomes* 2008; **6**: 2.
- 18 Jokovic A, Locker D, Guyatt G. Short forms of the Child Perceptions Questionnaire for 11–14-year-old children (CPQ_{11–14}): development and initial evaluation. *Health Qual Life Outcomes* 2006; **4**: 4.
- 19 Foster Page LA, Thomson WM, Jokovic A, Locker D. Epidemiological evaluation of short form versions of the Child Perception Questionnaire. *Eur J Oral Sci* 2008; **116**: 538–544.
- 20 Bonomi AE, Patrick DL, Bushnell DM, Martin M. Validation of the United States' version of the World Health Organization Quality of Life (WHOQOL) instrument. *J Clin Epidemiol* 2000; **53**: 1–12.
- 21 Anastasia A. *Psychological Testing*, 6th edn. New York: Macmillan Publishing Company, 1988: 139–157.
- 22 Torres CS, Paiva SM, Vale MP *et al.* Psychometric properties of the Brazilian version of the Child Perceptions Questionnaire (CPQ_{11-14})-short forms. *Health Qual Life Outcomes* 2009; **7**: 43.
- 23 O'Brian C, Benson PE, Marshman Z. Evaluation of a quality of life measure for children with malocclusion. *J Orthod* 2007; 34: 185–193.

Copyright of International Journal of Paediatric Dentistry is the property of Wiley-Blackwell and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.