

## Original Research Article

# Impact factors on oral health related quality of life in patients requiring orthognathic surgery

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## Abstract

**Introduction and Objective:** Individuals with dentofacial deformities have a greater negative impact on oral health and in quality of life. The aim of this study was identified the main factors involved in the perception of the oral health related quality of life in individuals with dentofacial deformities. **Material and methods:** In a cross-sectional study, were evaluated 72 individuals in preoperative period of orthognathic surgery at the Oral and Maxillofacial Surgery Service at Federal University of Paraná and at Positivo University. The age, gender, facial profile, presence or absence of asymmetry and temporomandibular disorders (TMD) symptoms were accessed. Through the Oral Health Impact Profile-14 (OHIP-14) the perceptions about oral health related quality of life of the patients was accessed. The TMD symptoms were evaluated with Fonseca anamnestic index. Data were submitted to descriptive and inferential statistical analysis with a significance level of 0.05. **Results:** The OHIP-14 mean score was higher with increasing age ( $p= 0.007$ ), in females ( $p= 0.076$ ), asymmetric patients ( $p= 0.030$ ). and according to the increase in reported TMD symptoms ( $p= 0.001$ ). Individuals with no TMD symptoms had an OHIP-14 mean of  $8.86\pm 8.06$ ; individuals with mild TMD had a mean of  $15\pm 6.28$ , moderate TMD had a mean of  $20.6 \pm 9.44$  and severe TMD had a mean of  $26.42\pm 7.66$ . There were no differences between OHIP-14 and type of facial profile ( $p= 0.725$ ). **Conclusion:** It is concluded that increasing age, female gender, presence of asymmetry and the severity of TMD symptoms are important factors related to poor oral health related quality of life in individuals with dentofacial deformities.

## Introduction

Dentofacial deformities affect a large part of the world population and are generally characterized by malocclusions due to alterations in the development of the maxilla and/or mandible [2, 17]. These alterations affect masticatory, respiratory and articular function of the individuals as well as their phonics and facial aesthetics [17].

Individuals with severe malocclusion have a greater negative impact on oral health than the general population, directly affecting the quality of life of these individuals [8, 10, 16]. This seems to be related to functional limitation, pain and impairment in the social interaction of these individuals [7] that have been related to a higher rate of depression and psychological problems [3, 12].

Some studies [1, 4] have shown previously the important role of temporomandibular dysfunction (TMD) in worsening the quality of life of these individuals. According to the American Academy of Orofacial Pain, temporomandibular disorders may be associated with a set of musculoskeletal and neuromuscular disorders that affect the stomatognathic system and are characterized by pain and functional limitation. Pain is the main factor that negatively affects the quality of life of individuals. In many cases, TMD it may become chronic [4], harming the individual in his/her daily activities, restricting social interaction [4, 19]. It is known that patients before correcting their malocclusion through orthodontics and orthognathic surgery have a significant incidence of TMD when compared to a control population, but the reasons for these findings are unclear [1, 19].

The aim of this study's author was to identify the main factors that may be involved in the perception of the oral health related quality of life of individuals with dentofacial deformities.

## Material and methods

The project was approved by the local ethics committee (CAAE: 80846317.8.0000.0093). The research was ethically conducted based on the Helsinki Declaration and complies with STROBE guidelines. A cross-sectional study was performed with patients from Oral and Maxillofacial Surgery Service at Federal University of Paraná and at Positivo University. The inclusion criteria were adult patients with skeletal malocclusion in preoperative treatment for orthognathic surgery. The exclusion criteria were patients who had undergone other facial surgeries or patients in TMD treatment. All of the patients who attended the inclusion criteria

and who agreed to participate in the research were evaluated about age, gender, type of facial profile, presence or absence of mandibular asymmetry and temporomandibular disorders symptoms. The facial profile was classified according to a facial analysis [15]. Patients were classified as Pattern I, Pattern II or Pattern III. Pattern I is identified by facial normality. Pattern II and III are characterized by the sagittal step and, respectively, positive and negative between the maxilla and the mandible. The asymmetry was considered when the patient had a mandible midline deviation greater than 4 mm in relation with the maxilla midline. According to authors [13], the clinical expression of asymmetry only occurs when the bone deviation is at least 4 mm. All evaluations were performed by a maxillofacial surgeon. In cases of disagreement in the diagnosis, a consensus diagnosis was obtained from a senior surgeon.

The patients also were evaluated about their oral health related quality of life perception. The self-rated oral health related quality of life was assessed using the simplified and self-applied version of OHIP-14. This questionnaire contains 14 questions grouped into seven subscales, which consist of functional limitation; physical suffering; psychological discomfort; physical disability; psychological incapacity and disability and social disability. The questions are scored on a Likert scale, where 0 indicates never, 1 indicates rarely, 2 indicates sometimes, 3 indicates constantly and 4 indicates always. In order to obtain the final scale score, the additive method was chosen by calculating the sum of points for each OHIP-14 item, and the sum can vary from 0 to 56, indicating that the higher the value, the greater the impact on quality of life of oral health.

To evaluate TMD symptoms, the Fonseca anamnestic index was used, consisting of 10 subjective questions answered by the patients themselves, about symptoms of temporomandibular disorder (TMD). This questionnaire allows three options for answers (not, sometimes and yes), for which there are preset three scores (0, 5 and 10, respectively). With the sum of the points assigned, we obtained an anamnestic index that classifies the severity of symptoms into categories: absence of TMD (0 to 15 points), mild TMD (20 to 45 points), moderate TMD (50 to 65) and severe TMD (70 to 100 points). To consider the presence or absence of TMD, all individuals with mild, moderate or severe TMD were classified as having TMD.

The results were submitted for descriptive and inferential statistical analysis. The OHIP-14 mean score was compared with the dichotomous variables gender and asymmetry, using the Student's T test for independent samples. Age was also categorized into four groups: less than 20, 20-30, 30-40 and over 40 years old. To correlate with the numeric variable, OHIP-14 was determined by Pearson correlation coefficient. The OHIP-14 averages were then compared with the categorical variables age, skeletal malocclusion and TMD levels using the one-way ANOVA test followed by Tukey's post-test. It was performed a sensitivity analyses to compare OHIP-14 with TMD and age. The numerical/ordinal variables were transformed in dichotomous categorical variables (supplementary file). Values of  $p < 0.05$  indicated statistical significance. For the multiple linear regression model, the independent variables were related to the OHIP-14 dependent variable. Independent variables with  $p < 0.2$  were added to the step-wise model. In the final model, independent variables whose  $p \leq 0.05$  or that adjusted the other variables by 10% remained. The data were analyzed with the IBM SPSS (Statistical Package for Social Sciences, Chicago, IL, USA) software version 24.0.

## Results

A total of 74 patients were underwent surgery in the period of research, two patients were excluded because did not answer the questionnaires, thus, 72 patients are included. For these patients, there were no missing data. The sample had a mean age of 29.17 years  $\pm$  9.59, was predominantly female and was composed of 45 women (62.5%) and 27 men (37.5%). Of the individuals evaluated, 18.3% were classified with facial profile pattern I, 28.2% with pattern II and 53.5% with pattern III. In addition, 27.8% had mandibular asymmetry.

The OHIP-14 mean of the total sample was 17.32  $\pm$  9.57. There was an association between age and OHIP-14 score (Pearson correlation,  $p = 0.007$  [ $r = 0.317$ ]); the OHIP-14 mean score was higher with increasing age. In table I, it is possible to visualize the means of OHIP-14 with the respective age groups.

**Table I** - Correlation between age groups and the mean score of the OHIP-14

Age (Years)	OHIP-14 Mean (SD)
<20	11 ( $\pm$ 2,478) <sup>a</sup>
20-30	15,72 ( $\pm$ 1,358) <sup>a</sup>
30-40	17,6 ( $\pm$ 3,027) <sup>ab</sup>
>40	24,25 ( $\pm$ 2,55) <sup>b</sup>

Note: ANOVA one way; Tukey post-test, significance level 0.05  
Different letters indicate significant differences,  $p < 0,05$

In relation to gender, women presented a mean of 19.18 ( $\pm$  1.31) compared to 14.22 ( $\pm$  1.96) in the male gender ( $p = 0.03$ ). Table II shows the distribution of individuals according to their skeletal malocclusion and the OHIP-14 averages corresponding to these individuals. There was no statistical difference between the OHIP-14 mean and the different skeletal malocclusion ( $p = 0.725$ ). But in relation to asymmetry, asymmetric individuals had a higher OHIP-14 mean score, totaling 20.9 ( $\pm$  2.13) compared to 15.94 ( $\pm$  1.29) in non-asymmetric individuals ( $p = 0.048$ ).

**Table II** - OHIP-14 mean scores among individuals of different facial profile

Skeletal malocclusion	n (%)	OHIP-14 Mean (SD)
Pattern I	13 (18,0%)	18,69 ( $\pm$ 6,32)
Pattern II	20 (27,8%)	17,7 ( $\pm$ 9,66)
Pattern III	39 (54,2%)	16,37 ( $\pm$ 10,52)

Note: ANOVA one way, significance level 0.05 ( $p = 0,725$ )

Regarding the symptoms of TMD evaluated by the Fonseca index, 80.6% of the individuals presented some level of TMD. Table III presents the prevalence of different TMD levels and the means of OHIP-14 scores corresponding to these individuals. The average score OHIP-14 increased with increasing severity of TMD ( $p < 0.001$ ). Individuals without TMD or with mild TMD had a mean OHIP-14 significantly lower than individuals with moderate and severe TMD did.

**Table III** - OHIP-14 mean scores among TMD symptoms reported

TMD	n (%)	OHIP-14 Mean (SD)
Absent	14 (19,4%)	8,86 ( $\pm$ 8,06) <sup>a</sup>
Mild	26 (36,1%)	15,15 ( $\pm$ 6,28) <sup>a</sup>
Moderate	20 (27,8%)	20,60 ( $\pm$ 9,44) <sup>b</sup>
Severe	12 (16,7%)	26,42 ( $\pm$ 7,66) <sup>b</sup>

Note: ANOVA one way; Tukey post-test, significance level 0.05. Different letters indicate significant differences

In order to verify the influence of all variables in quality of life of these individuals, a multivariate linear regression model was performed. These data can be seen in table IV. It is worth pointing out that age, asymmetry and TMD symptoms remained associated with oral health related quality of life ( $p < 0.05$ ). For age, with each increase of one year of life, there is a poor perception of the oral health related quality of life in 0.217 units of OHIP-14. As for mandibular asymmetry, with every 1 mm increase in asymmetry, there is a worsening of the perception of oral health related quality of life in 0.228 units of OHIP-14. For TMD symptoms, at each increase in the intensity category of symptoms, there is an increase of 0.351 units of OHIP-14.

**Table IV** - Multiple linear regression model

Variables	OHIP- 14			
	$\beta$ Coefficient	$p$ Value	$\beta$ Coefficient <sub>a</sub>	$p$ Value <sub>a</sub>
Age	0.316	0.007	0.217	0.041
Gender	- 0.252	0.032	- 0.192	0.076
Assymetry	- 0.234	0.048	- 0.228	0.030
TMD	0.438	<0.001	0.351	0.001

Note: Multivariate linear regression, significance level of 0,05

a = adjusted

## Discussion

The sample of this study was predominantly female and was made up mostly of people with skeletal malocclusion III, which agrees with other studies in individuals with dentofacial deformity [1, 5, 12, 14, 16-18]. We found that the females showed worse perception of oral health related quality of life; however, this result was not maintained in the multivariate analysis, demonstrating that this worsening is related to other factors inherent to the gender.

Oral health related quality of life showed a progressive worsening in patients with increasing age. Bortoluzzi *et al.* [5] reported that increasing age of patients with dentofacial deformity produced negative impacts on the quality of life in different ways, mainly in facial aesthetics and in the domains of oral function, such as mouth opening. These results demonstrate that individuals with deformity do not get used to their functional and aesthetic conditions and may present cumulative damages caused by this alteration.

In relation to the facial characteristics, the type of facial profile did not have an impact on the oral health related quality of life, which was similar to the study by Rusanen *et al.* [16]. However, the presence of asymmetry worsened the perception of individuals about oral health related quality of life, corroborating with the literature [14, 17]. Mandibular asymmetry is considered to be a characteristic related to important functional and aesthetic damages, which can generate the feeling of not being physically attractive. Some people may even feel aesthetically impaired to the point of having a social disadvantage [20]. In addition, while the facial profile can only be seen in a side view, the asymmetry is noticeable in the frontal view, which is the main visual approach of the self and others. This finding should be considered when proposing an orthodontic-surgical treatment, for better social acceptance and consequently a better quality of life.

The degree of TMD severity reported also showed a direct relationship with the values obtained in OHIP-14. The TMD remained strongly

inserted in the multivariate analysis, demonstrating that together with the increase of the age and the presence of asymmetry, they are the most important factors for the poor oral health related quality of life of these individuals. According to Cascone *et al.* [6], despite the different results provided by the various studies, a certain prevalence of TMD is always present in patients with maxillomandibular deformity and it asserts the necessity to treat patients who have maxillomandibular deformities and TMD by performing a specific treatment for the dysfunction.

The impact of TMD on oral health related quality of life has previously been reported by other authors [1, 4]. In addition, studies have shown that the perception of quality of life in TMD individuals is significantly worse when individuals have an associated psychological problem [1, 9], which is a factor frequently present in the beginning or worsening of dysfunction. It is known that dentofacial deformities require understanding and attention to the psychosocial and physical issues of the individual once aesthetics and function are the main reasons that lead them to seek treatment [17]. Although orthognathic surgery has been shown to provide a positive effect on individuals' quality of life [1, 7, 12, 16, 17], the presence of TMD before and after treatment may compromise the satisfaction of individuals and lead to a deterioration of quality of life [1].

One of the limitations of this study was the absence of a control group to compare TMD and oral health related quality of life between individuals with dentofacial deformities and patients with normal skeletal relationships. Johnston *et al.* [11] showed that patients with dentofacial deformities are less happy when compared to a control group. Others limitations of these study were the absence of psychological evaluation and a follow-up after the orthognathic treatment.

## Conclusion

So, through all the data found in our research, it can be concluded that the age increase, the presence of asymmetry and the TMD symptoms are directly associated to the poor perception of oral health related quality of life in individuals with dentofacial deformities who require orthognathic treatment.

## References

1. Al-Ahmad H, Al-Bitar Z. The effect of temporomandibular disorders on condition-specific quality of life in patients with dentofacial deformities. *Oral Surg Oral Med Oral Pathol Oral Radiol.* 2014;117:293-301.
2. Almasri M. The prevalence of skeletal malocclusion in the southern aseer region of Saudi Arabia. *Am J Med Sci.* 2014;2:13-5.
3. Baherimoghaddam T, Tabrizi R, Naseri N, Pouzesh A, Oshagh M, Torkan S. Assessment of the changes in quality of life of patients with class II and III deformities during and after orthodontic-surgical treatment. *Int J Oral Maxillofac Surg.* 2016;45:476-85.
4. Bayat M, Abbasi A, Noorbala A, Mohebbi S, Moharrami M, Yekaninejad M. Oral health-related quality of life in patients with temporomandibular disorders: a case-control study considering psychological aspects. *Int J Dent Hyg.* 2017;16:165-70.
5. Bortoluzzi M, de Camargo Smolarek P, Claudino M, Campagnoli E, Manfro R. Impact of dentofacial deformity on quality of life: age and gender differences evaluated through OQLQ, OHIP and SF36. *J. Oral Maxillofac Res.* 2015;6.
6. Cascone P, Di Paolo C, Leonardi R, Pedullà E. Temporomandibular disorders and orthognathic surgery. *J Craniofac Surg.* 2008;19:687-92.
7. Choi S, Kim B, Cha J, Hwang C. Impact of malocclusion and common oral diseases on oral health-related quality of life in young adults *Am J Orthod Dentofacial Orthop.* 2015;147:587-95.
8. De Lucas Corso PFC, De Oliveira FAC, Da Costa DJ, Kluppel LE, Rebellato NLB, Scariot R. Evaluation of the impact of orthognathic surgery on quality of life. *Braz Oral Res.* 2016;30.
9. Gameiro G, da Silva Andrade A, Nouer D, Ferraz de Arruda Veiga M. How may stressful experiences contribute to the development of temporomandibular disorders? *Clin Oral Investig.* 2006;10:261-8.
10. Johal A, Joury E. What factors predict the uptake of orthodontic treatment among adults? *Am J Orthod Dentofacial Orthop.* 2015;147:704-10.

11. Johnston C, Hunt O, Burden D, Stevenson M, Hepper P. Self-perception of dentofacial attractiveness among patients requiring orthognathic surgery. *Angle Orthod.* 2010;80:361-6.
12. Kim S, Kim M, Shin S, Chun Y, Kim E. Evaluation on the psychosocial status of orthognathic surgery patients. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2009;108:828-32.
13. Pullinger A, Seligman D, Gornbein J. A multiple logistic regression analysis of the risk and relative odds of temporomandibular disorders as a function of common occlusal features. *J Dent Res.* 1993;72:968-79.
14. Razera MV, Silva ABD, Gorgen ARH, Carbajal JM, Splitt BI, Portinho CP et al. Initial clinical presentation in patients with temporomandibular dysfunction. *Revista HCPA.* 2012;15:109-12.
15. Reis SAB, Abrão J, Claro CAA, Capelozza Filho L. Avaliação dos fatores determinantes da estética do perfil facial. *Dental Press J Orthod.* 2011;16:57.
16. Rusanen J, Lahti S, Tolvanen M, Pirttiniemi P. Quality of life in patients with severe malocclusion before treatment. *Eur J Orthod.* 2010;32:43-8.
17. Sadek H, Salem G. Psychological aspects of orthognathic surgery and its effect on quality of life in Egyptian patients. *East Mediterr Health J.* 2007;13:150-9.
18. Santos R, Sebastiani AM, Toderó SRB, Moraes RSD, Costa DJD, Rebelatto NLB et al. Complications associated with sagittal osteotomy of the mandibular branches. *J Oral Maxillofac Surg.* 2012;12:77-84.
19. Sebastiani A, Baratto-Filho F, Bonotto D, Kluppel L, Rebellato N, da Costa D et al. Influence of orthognathic surgery for symptoms of temporomandibular dysfunction. *Oral Surg Oral Med Oral Pathol Oral Radiol.* 2016;121:119-25.
20. Thiesen G, Gribel BF, Freitas MPM. Facial asymmetry: an up-to-date review. *Dental Press J Orthod.* 2015;20:110-25.