Revista ARACÊ
ISSN: 2358-2472

THE IMPACT OF MALOCCLUSION ON THE QUALITY OF LIFE RELATED TO CHILDREN'S ORAL HEALTH THROUGH THE PERCEPTION OF CHILDREN AND THEIR CAREGIVERS

https://doi.org/10.56238/arev7n1-036

Date of submission: 03/12/2024 **Date of publication:** 03/01/2025

Christiane Vasconcellos Cruz[1], Giulia Trotta Panaro[2], Thayze Ioren Siqueira de Oliveira[3], Ronir Raggio Luiz[4], Flávia Martinez de Carvalho[5], Marcelo de Castro Costa[6] and Claudia Trindade Mattos[7]

ABSTRACT

This study focused on assessing the quality of life in children with malocclusion, the caregivers' perception related to children's quality of life, in addition to the correlation between quality of life and the severity levels of malocclusion. The Child Perception Questionnaires (CPQ8-10 and CPQ11-14) and Parental-Caregiver Perceptions Questionnaire (P-CPQ) were performed. For this purpose, 656 participants were selected (328 children aged 8-14 years and their 328 caregivers). Children were examined and divided into two groups according to the presence (case) or absence (control) of malocclusion by the Dental aesthetic Index (DAI). CPQ8-10, CPQ11-14 and P-CPQ were performed in face-to-face interviews and traits were assessed [oral symptoms (OS), Functional limitations (FL), Emotional well-being (EW), social well-being (SW)]. Participants with systemic and/or cognitive changes and orthodontic treatment were excluded. Statistical analysis was performed on SPSS 20.0 Program. The scores CPQ8 – 10, CPQ11 - 14 and P-CPQ were calculated by the additive method. The student t test was performed to compare groups. To analyze the association between the intensity of the ordinal variables, the Spearman correlation test was used. From a total of 328 children, 196 (59.8%) were 8 to 10 years old (mean age, 8.79±0.807 years) and 132 (40.24%) were 11 to 14 years old (mean age, 11.89±1,065 years). The caregivers mean age was 35.22±12.3 years. No statistically significant differences were noted between case and control groups in terms of age, sex, or socioeconomic class (p-value .237, .991, and .608, respectively). Malocclusion impacted the children' quality of life in the life domain EW (p=0,014). Malocclusion impacted the perception of caregivers related to children's quality of life on the OS (p=0.049) and FL (p=0.003) domains. There was a positive correlation between the decline in the quality of life of children according to the severity of their malocclusion We concluded that

[1] PhD
Federal University of Rio de Janeiro (UFRJ)
[2] Undergraduate student (Dentistry)
Federal University of Rio de Janeiro (UFRJ)
[3] Master's Degree
Federal University of Rio de Janeiro (UFRJ)
[4] PhD
Federal University of Rio de Janeiro (UFRJ)
[5] PhD
Oswaldo Cruz Foundation (FIOCRUZ)
[6] PhD
Federal University of Rio de Janeiro (UFRJ)
[7] PhD
Fluminense Federal University (UFF)

Revista ARACÊ
ISSN: 2358-2472

malocclusion impacted both children and the caregivers' perception related to children's quality of life. The decline in quality of life was straightly correlated to the severity of malocclusion.

Keywords: Malocclusion. Quality of Life. Questionnaire. Children.

Revista ARACÊ
ISSN: 2358-2472

INTRODUCTION

Malocclusion, due to its high prevalence, is the third most frequent oral health problem in the world, exceeded only by dental caries and periodontal disease (WHO, 2003). This may lead to functional and aesthetic disturbances with psychosocial implications, thereby affecting the quality of life of children and adults. However, in underdeveloped and developing countries, the relationship between malocclusion, aesthetic impact, and quality of life is largely unexplored (DAWOODBHOY et al., 2013) and orthodontic treatment can be considered a cultural phenomenon mediated by affordability (PERES et al., 2002).

A number of quality of life questionnaire measures have been developed for use with children, but none are widely accepted (DAWOODBHOY et al., 2013). The child perception questionnaires (CPQs) were designed to evaluate the impacts of oral conditions in children based on age (CPQ_{8-10} and CPQ_{11-14})(JOKOVIC et al., 2004; LOCKER et al., 2005) and it is an important tool due to its demonstrable psychometric properties (JOKOVIC et al., 2002). However, when its performance was assessed against clinical indicators, modest associations were often observed (FOSTER-PAGE et al., 2005).

In this context, The Dental Aesthetics Index (DAI) was developed to identify occlusion and aesthetic characteristics of the patients. This combines clinical and aesthetic components of occlusion mathematically to produce a single score which is strongly associated with the malocclusion severity and self-perception of the need for orthodontic treatment (HAMANCI et al., 2009). Moreover, It has been adopted by the World Health Organization as a cross-cultural index (World Health Organization, 1997) and applied in diverse ethnic groups without modification (CONS and JENNY, 1994; CONS et al., 1994).

Knowledge of the impact of oral health conditions on oral health-related quality of life (OHRQoL) contributes by providing a measure of outcome to improve the quality of care (AGOU et al., 2008, ANDERSON et al., 2014). Furthermore, it contributes towards the implementation of public policies aimed at minimizing social inequalities and expanding access to health, education, housing, and work to provide individuals with a satisfactory quality of life (Cons et al., 1987). Therefore, the aim of this study was to assess the quality of life in children with malocclusion, the caregivers' perception related to children's quality of life, in addition to the correlation between quality of life and the severity levels of malocclusion. It was hypothesized that children's quality of life deteriorates with increasing levels of malocclusion severity.

Revista ARACÊ
ISSN: 2358-2472

MATERIALS AND METHODS

The study was approved by the Research and Ethical Committee of Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil (# CAAE 43979715.3.0000.5257 and #CAAE 55615722.6.0000.5275). Written consent was obtained from caregivers or legal guardians, in the case of minors.

This cross-sectional study was based on a convenience sample of Brazilian children aged 8 to 14 years and their caregivers consecutively recruited from those attending the Pediatric dentistry clinic of Universidade Federal do Rio de Janeiro (Rio de janeiro, Brazil), between August 2017 and June 2023. All participants included were Brazilian with no history of previous orthodontic treatment. The following exclusion criteria were applied: Craniofacial malformation or syndromes with dentofacial manifestations, and mental or behavioral disorders that could interfere in the participants' self-perception of the assessed factors.

Power calculation was performed through a pilot study composed of 86 individuals, distributed as follows: 52 individuals formed the case group and 34 formed the control. The standard deviation and the difference between both groups in the quality of life scale were 25 and 7 points, respectively, thereby, with regards to a confidence interval of 95% and a power calculation of 80%, considered an important difference between groups of 7 points, the sample size of 302 individuals was demonstrated to be significant.

DATA COLLECTION

Data was collected through structured face-to-face interviews and dental clinical examinations regarding the subjects' occlusal conditions. Malocclusion, as well as the need for orthodontic treatment, was carried out through the Dental Aesthetic Index (DAI). In addition, data on dental carie prevalence (CPO-D index) was assessed. The criteria for the diagnosis of dental cavities were based on World Health Organization recommendations, using the decayed, missing, and filled teeth index (OMS, 1997). During interviews, children and caregivers answered a specific questionnaire formatted according to their perception to assess the impact of malocclusion on quality of life, as follows, CPQ_{8-10} (for children aged at 8 to 10 years) and CPQ_{11-14} (for children aged at 11 to 14 years) and Parental-Caregiver Perceptions Questionnaire (P-CPQ) (JOKOVIC et al., 2002). For economic characterization, patients' parents or guardians filled out a questionnaire related to information on the head of the household’s occupation, education, property ownership, and

Revista ARACÊ
ISSN: 2358-2472

income (Critérios de Classificação Econômica, 2008). This classification system revealed six social classes, which were subsequently dichotomized for analysis as low (C1, C2, D) or high (A2, B1, B2).

DENTAL AESTHETIC INDEX (DAI)

DAI assesses the aesthetic aspects of dental occlusion, identifying the need for orthodontic treatment based on malocclusion severity. The scale defines severity in a similar manner to an orthodontist's' judgement. DAI scores equal to or lower than 25 (degree 1) refer to malocclusions with a slight need for orthodontic treatment. Scores varying from 26 to 30 (degree 2) represent malocclusions with an elective need for treatment. Scores varying from 31 to 35 (degree 3) represents malocclusion with a high need for treatment. Scores ≥ 36 (degree 4) represent severe malocclusion with compulsory need for treatment (WHO, 1997). According to the weighted kappa, interexaminer and intraexaminer reliability values were 0.88 (IC95% 0,86-1,0) and 0.89 (IC95% 0,86-1,0), respectively. The DAI score in the control group (degree 1 and 2) and case group (degree 3 and 4) were dichotomized to assess possible associations.

CPQS QUESTIONNAIRE

The CPQs questionnaire is part of the Child Oral Health Quality of Life Questionnaire (COHQoL), which is a set of multidimensional scales measuring the effects of oral and orofacial conditions on the functional, emotional, and social well-being of children and their families. The COHQoL consists of the Parental-Caregiver Perceptions Questionnaire (JOKOVIC et al, 2013), the Family Impact Scale (LOCKER et al, 2002) and three age-specific questionnaires for children (Child Perceptions Questionnaires, CPQs) (JOKOVIC et al, 2002; JOKOVIC et al., 2004;). The choice of which specific questionnaire would be performed depends on the aim of the research. Caregivers/parents and Children were asked to fill out the questionnaire, but without any interefrence from each other. Each child was given instruction on how to fill out the questionnaire and told that only one answer should be marked per item. The Brazilian version of the $CPQ_{8–10}$ (MARTINS, 2008) and CPQ_{11-14} (TORRES, 2008) and P-CPQ (GOURSAND et al., 2009) have been validated and culturally adapted for Brazilian Portuguese. These questionnaires, which had good internal consistency (Cronbach's alpha, 0.84) and test-retest reliability (Spearman's correlation coefficient, 0.65), consisted of 26 items inquiring about effects on four health

Revista ARACÊ
ISSN: 2358-2472

domains: Oral Symptoms (OS) (4 items), functional limitations (FL) (4 items), emotional well-being (EW)(4 items), and social well-being (SW) (9 items) (JOKOVIC et al, 2004) with a maximum score of 104. Questions ask about the frequency of events in the past 3 months in relation to child's oral/orofacial condition. The response options are never (0), once/ twice (1), sometimes (2), often (3), and everyday/ almost every day (4). Regarding the total score of each answer, the quality of life is defined by the following outcome: the greater the sum of the scores, the worse the child's quality of life.

STATISTICAL ANALYSIS

For statistical analysis, the program Statistical Package for the Social Science (SPSS) version 20.0 for Windows was applied. Groups were compared by sociodemographic characteristics (sex, age, and economic characterization) with the Chi-square test. The Kolmogorov-Smirnoff or Shapiro-Wilk tests were applied to verify the data normality. The scores of CPQ8-10 and CPQ_{11-14} and P-CPQ were calculated by summing the measure of impact on quality of life and the Student t test was applied to verify the difference amongst groups. To verify the intensity and extension of the association, The Spearmen correlation test was applied.

RESULTS

The sample consisted of 328 children, 148 boys (45.1%; mean age 9.76±1.812) and 180 girls (54.9%, mean age 10.26 ±1.728); 196 (59.8%) were 8 to 10 years old (mean age, 8.79±0.807 years), and 132 (40.24%) were 11 to 14 years old (mean age, 11.89±1,065 years). The DAI was quite similar between sex, with no statically significant difference (p=0.613) and the CPO-D was not significant between case and control groups as well as between sex (p= 0.169, p=0.166)(Table 1).

No statistically significant differences were noted between case and control groups in terms of age, sex or economic characterization (p-value .237, .991, and .0.608, respectively). Overall, each group comprised a slightly greater number of female subjects (Table 1). Moreover, the majority of the sample comprises the economic characterization C1 followed by C2 in both case and control group (Table 1).

The quality of life of individuals with malocclusion (case group) was considered worse when compared to individuals without malocclusion (control group) (Tables 2A and 2B), but it was not statiscally significant (p= 0.470 and p = 0.873, respectively). However, in

Revista ARACÊ
ISSN: 2358-2472

the life domain EW, the quality of life of children aged at 8-10 was impacted (p=0,014) (Table 2). Malocclusion impacted the caregivers' perception related to children quality of life (p=0.015), mainly in the life domain LF (p=0.003) and SO (p=0.049, boderline significant) (Table 3). There was a positive correlation (Figure 1) between the decline in the quality of life of individuals, from the perception of both children and caregivers, according to the severity of malocclusion (p = 0.009) (Table 4).

Table 1. characterization of the studied sample

CHARACTERIZATION	CHILDREN	CAREGIVERS		FREQUENCY CASE CONTROL		
	(N=328)	(N=328)	P-VALUE	(N=204)	(N=124)	P- VALUE
AGE mean (SD)	10.04(1.78)	35.22(12.3)		9.73 (1.63)	10.55 (1.90)	0.237[a]
GÊNDER n(%)						
MALE	148(45.1)	90(27.5)		92(45.1)	56(45.2)	
FEMALE	180(54.9)	238(72.5)		112(54.9)	68(54.8)	0.991
DAI mean (SD)	31,90(7,87)	-		39.41(8.26)	25.89(3.36)	
MALE	34.01(0.25)	-		39.43(7.41)	26.49(3.03)	
FEMALE	34.54(8.78)	-	-	39.39(9.22)	25.16(3.41)	*
DMFT mean (SD)	1.92(2.35)	-				
MALE	2.08(2.51)	-		2.36(2.66)	1.63(2.20)	
FEMALE	1.72(2.15)	-	-	2.13(2.50)	1.37(1.81)	0.169
[a]CCEB n(%)						
A2	4(1.2)	-		4(2.0)		
B1	26(7.9)	-		12 (5.9)	14(11.3)	
B2	81(24.7)	-		52(25.5)	29(23.4)	
C1	115(35.1)	-		72(35.3)	43(34.7)	
C2	86(26.2)	-		52(25.5)	34(27.4)	
D	7(4.9)	-	-	12(5.9)	4(3.2)	
QUALITY OF LIFE mean(DP)	13.65(8.20)	23.19(16.44)	*	13.71(7.66)	13.56(9.05)	0.873
Quality of life X DAI	*	-				

Student t test and Spearman correlation test[a], *P-value<0.001. [a] Brazilian economic classification criteria CCEB B2 < R$ 3.118, C1 < R$1.865 C2 < R$ 1.277 D2<R$ 895.

Table 2A. Quality of life amongst schoolchildren on CPQ 8-10

STUDIED SAMPLE (n=196)		Score	OS	FL	EW	SW
CASE n=132	Mean	15.80	5.84	2.19	3.20	2.45
	SD*	9.30	3.34	2.25	3.88	2.68
CONTROL n=64	Mean	14.85	5.64	2.19	3.20	2.45
	SD*	8.26	2.68	2.12	1.97	2.68

Revista ARACÊ
ISSN: 2358-2472

	P valor	0.470	0.641	0.843	0.014	0.522
Note: Student t test, *SD:Standard deviation						

Tabel 2B. Quality of life among scholchildren on CPQ11-14						
STUDIED SAMPLE (n=132)		Score	OS	FL	EW	SW
CASE n=72	Mean	11.61	4.22	1.89	3.28	2.22
	SD*	5.91	2.35	1.92	2.80	2.27
CONTROL n=60	Mean	11.17	4.45	1.70	3.18	1.83
	SD*	8.20	2.35	1.38	3.83	3.07
	P value	0.719	0.540	0.526	0.871	0.405
Note: Student t test, *SD:Standard deviation						

Tabel 3. Quality of life among caregivers on P-CPQ						
STUDIED SAMPLE (n=328)		Score	SO	LF	BEE	BES
CASE n=204	Mean	24.90	6.86	7.55	5.37	5.12
	SD*	16.76	3.84	6.92	5.19	5.68
CONTROL n=124						
	Mean	20.36	6.01	5.39	5.06	3.91
	SD*	15.56	3.77	5.12	5.14	5.73
	P value	0.015	0.049	0.003	0.592	0.065
Note: Student t test, *SD:Standard deviation						

Tabel 4. Correlation analysis among the studied variables.							
		DAI Scores	CPQ Scores	OS	FL	EW	SW
DAI Scores	Spearman Correlation	1	.364**	.192	.228	.166	.438**
	P valor		.009	.177	.107	.244	.001
	N	328	328	328	328	328	328
CPQ Scores	Spearman Correlation	.364**	1	.582**	.529**	.832**	.745**
	P valor	.009		.000	.000	.000	.000
	N	328	328	328	328	328	328
OS	Spearman Correlation	.192	.582**	1	.126	.400**	.076
	Sig. (2-tailed)	.177	.000		.380	.004	.597
	N	328	328	328	328	328	328
FL	Spearman Correlation	.228	.529**	.126	1	.182	.386**
	Sig. (2-tailed)	.107	.000	.380		.202	.005
	N	328	328	328	328	328	328
EW	Spearman Correlation	.166	.832**	.400**	.182	1	.580**
	Sig. (2-tailed)	.244	.000	.004	.202		.000
	N	328	328	328	328	328	328
SW	Spearman Correlation	.438**	.745**	.076	.386**	.580**	1
	Sig. (2-tailed)	.001	.000	.597	.005	.000	
	N	328	328	328	328	328	328

Revista ARACÊ
ISSN: 2358-2472

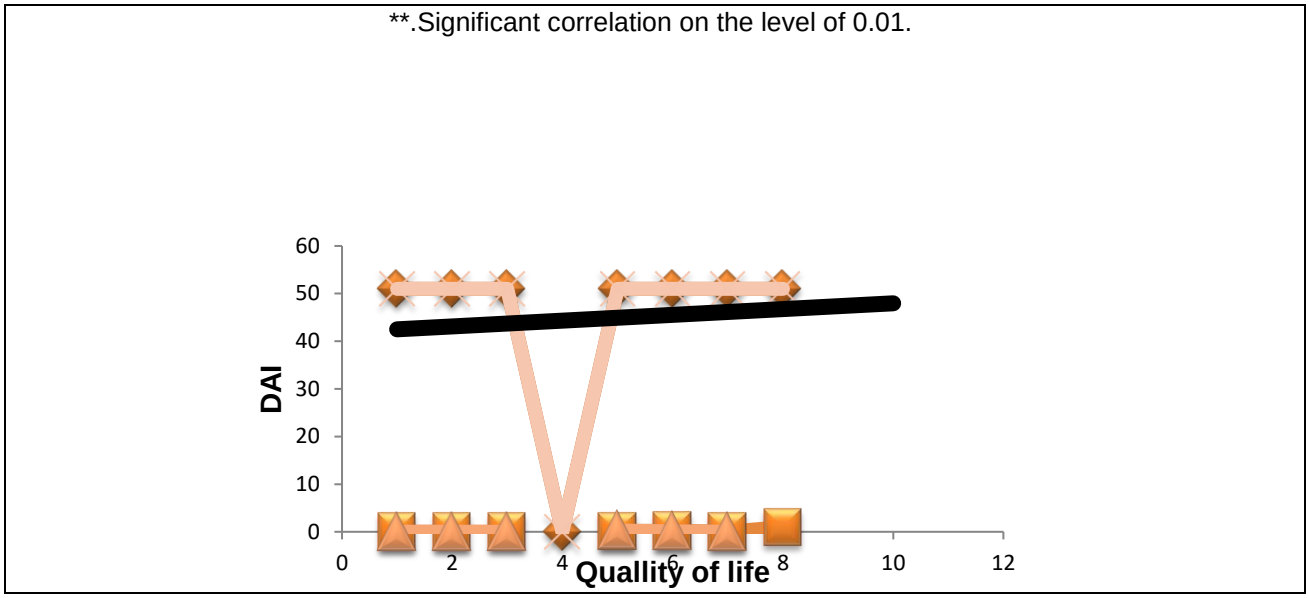

Figure 1. DAI related to quality of life in the studied population

DISCUSSION

Oral diseases are rarely life-threatening and their treatment and prevention are often not a priority for public health policies. Therfore, it is worth mentioning the great importance related to the link between oral diseases and their impact on quality of life of individuals (CHEN and HUNTER, 1996; FEITOSA et al., 2005). Furthermore, public policies can provide essential planning and information in which the attention to health can be prioritized (BERNABÉ et al., 2007), and promote a better understanding of the consequences of malocclusion in the lives of individuals. However, it is difficult to determine the precise impact of malocclusion on quality of life, because values attributed to dentofacial aesthetics vary according to cultural and social traditions (ONEYASU et al., 2003).

This study showed that the more severe forms of malocclusion were perceived by both children and caregivers. The total CPQs score and domain were lowest for children without malocclusion and highest for very severe malocclusion, with between-group differences of up to 1 unit. But malocclusion didn't impact children's quality of life (p=0.873). On the other hand, malocclusion impacted the caregivers' quality of life and also both lifes domains OS and LF. In this context, the greater the degree of malocclusion measured by DAI, the higher the scores obtained with the quality of life (p = 0.009), which indicates that quality of life was affected by the severity of malocclusion. These results corroborate the findings of Heravia et al (2011) and Bernabé et al (2008) in which the quality of life was affected in the presence of malocclusion. However, Taylor et al. (2009) observed that there

Revista ARACÊ
ISSN: 2358-2472

was no significant relationship between quality of life and malocclusion, whereas most studies in developed countries reported significant findings (FOSTER-PAGE et al., 2005; AGOU et al, 2008; ZHANG et al., 2009). The divergence in study results may be explained by no single definition for the concept of quality of life. It can therefore be argued that cultural influences, treatment expectations, and access to orthodontic services may play a role in how malocclusion affects children's quality of life (CONS et al. , 1987; DAWOODBHOY et al., 2013).

According to Petersen et al (2005) and Benzian et al (2009), tooth decay can cause negative impact on quality of life of children, adolescents, and their families, interfering with daily activities such as attending school and maintaining social relationships. In a survey conducted amongst children aged between 11 and 14 years (77.5% prevalence of caries with a mean CPO-D of 4.6) there was a statistically significant association between the impact on quality of life and dental caries (p =0.004) (FERNANDES, 2013). But in this study, the CPO-D was not statistically significant (p = 0.169) between the groups with and without malocclusion, there had not been a confounding factor.

In this study the majority of the population was classified in the C1 class, but there was no statistically significant difference between people with malocclusion (case group) and without malocclusion (control group) (p =.834). This set up the economic class not be related to malocclusion in this research, as well as in studies of Feu et al (2013), Bernabé et al (2008), Stenvik et al (2007) and Esperão (2006). A relationship is seen in the context of lower economic classes and higher caries and periodontal disease (SHAW et al., 1980; LOCKER, 1988). Malocclusion can be attributed to genetic factors and acquired functional conditions such as pasty diets, mouth breathing, and deleterious oral habits (pacifier sucking or digital, nail biting, tongue thrust). Davey-Smith (1994) states that socioeconomically disadvantaged individuals are more likely to develop harmful health habits.

A limitation of this study comprises three situations. On the first hand, the present findings are based on a sample of convenience and may not represent the general population of children in Brazil. However, we preferred using this convenience sample rather than a population-based sample as the latter might not have provided sufficient cases with severe or very severe malocclusion for a meaningful comparison. Secondly, the CPQs (CPQ_{8-10} and CPQ_{11-14}) questionnaires used in this study are a generic OHRQoL measure, and as such, they capture effects on quality of life attributed not only to

Revista ARACÊ
ISSN: 2358-2472

malocclusion but also to all oral conditions. The use of condition-specific OHRQoL measures is therefore encouraged in further studies, as they may help distinguishing the effects attributed to malocclusion from those caused by other oral conditions. Finally, the DAI was developed for permanent teeth and so has a tendency to be oversensitive during the mixed dentition period, possibly confounding the results due to the transitory developmental conditions. However, It is important to evaluate children presenting both the late mixed dentition and early permanent dentition, as an early diagnosis may facilitate preventive or interceptive orthodontics, if necessary, taking advantage of the child's growth potential (SANDEBERG et al, 2013).

It was observed that in this study the malocclusion affected the caregivers' quality of life on domains OS and LF ($p = 0.049$ and 0.003, respectively). According to Heravia et al. (2011), only the OS domain had a significant relationship with quality of life. In contradiction, O'Brien et al. (2007) found that the most significant impact of malocclusion in psychosocial quality of life was not because of oral or functional problems. Note that the difference in the outcome of these two studies may have occurred as a result of these authors use of different indices for the malocclusion measurement; Heravia et al. (2011) used the ICON (Index of complexity, outcome and need) and O'Brien et al. (2007), the IOTN (Index of orthodontic treatment need).

The IOTN is an index that ranks the malocclusion in terms of significance of various occlusal traits for dental health and the perceived disfigurement, incorporating a dental health related component and an aesthetic component that are classified into three degrees of need for treatment separately. ICON is based on the need for treatment, the severity of malocclusion, and the treatment outcome by observing five occlusal characteristics that generates a cutoff score that will indicate the need for orthodontic treatment (TAYLOR, 2009). Since the DAI has two components, a clinical one and an aesthetic one united mathematically to produce a single record that matches the functional and aesthetic aspects of occlusion, this can be considered, therefore, the most thorough index to measure the severity of malocclusion and need for treatment (ALMEIDA, 2010). Moreover, this presents great clinical and research applicability.

Revista ARACÊ
ISSN: 2358-2472

CONCLUSION

The quality of life of children, from the perception of children and caregivers, was negatively impacted by malocclusion. The decline in quality of life was straightly correlated to the severity of malocclusion.

CONFLICT OF INTEREST

We declare that the authors quoted here have no conflicts of interest.

ACKNOWLEDGEMENTS

Support for this work was provided by Postgraduate University Extension Program (PROEXT-PG CAPES) and Carlos Chagas Filho Foundation for Research Support of the State of Rio de Janeiro (FAPERJ # 204.234/2022).

Revista ARACÊ
ISSN: 2358-2472

REFERENCES

1. Agou, S., Locker, D., Streiner, D. L., & Tompson, B. (2008). Impact of self-esteem on the oral-health-related quality of life of children with malocclusion. *American Journal of Orthodontics and Dentofacial Orthopedics, 134*(4), 484–489.

2. Almeida, A. B. (2010). Prevalência de má oclusão e necessidade de tratamento ortodôntico em escolares de 12 anos de idade na cidade de Juiz de Fora, Minas Gerais. Dissertação (Mestrado em Saúde Coletiva) — Universidade Federal de Juiz de Fora, Juiz de Fora.

3. Benzian, H., Monse, B., Heinrich-Weltzien, R., Hobdell, M., Mulder, J., & Van Palenstein Helderman, W. (2011). Untreated severe dental decay: a neglected determinant of low Body Mass Index in 12-year-old Filipino children. *BMC Public Health, 13*(11), 558.

4. Bernabé, E., Sheiham, A., & Oliveira, C. M. (2008). Condition-specific impacts on quality of life attributed to malocclusion by adolescents with normal occlusion and Class I, II, and III malocclusion. *Angle Orthodontist, 78*(6), 977–982.

5. Bernabé, E., Tsakos, G., & Sheiham, A. (2007). Intensity and extent of oral impacts on daily performances by type of self-perceived oral problems. *European Journal of Oral Sciences, 115*, 111–116.

6. Brasil. Ministério da Saúde. (2011). Relatório SB Brasil 2010: Pesquisa Nacional de Saúde Bucal – 2010. Resultados principais. Brasília, DF.

7. Chen, M. S., & Hunter, P. (1996). Oral health and quality of life in New Zealand: a social perspective. *Social Science & Medicine, 43*, 1213–1222.

8. Cons, N. C., Jenny, J., & Kohout, F. J. (1987). Associations of dental aesthetics (DAI) with dental appearance, smile, and desire for orthodontic treatment. *Journal of Dental Research, 66*, 1081.

9. Cons, N. C., & Jenny, J. (1994). Comparing perceptions of dental aesthetics in the USA with those in eleven ethnic groups. *International Dental Journal, 44*, 489–494.

10. Cons, N. C., Jenny, J., Kohout, F. J., et al. (1994). Comparing ethnic group-specific DAI equations with the standard DAI. *International Dental Journal, 44*, 153–158.

11. Continuous improvement of oral health in the 21st century – The approach of the WHO Global Oral Health Programme [homepage]. Geneva: World Health Organization; 2003. Disponível em: <http://www.who.int/en>.

12. Critérios de Classificação Econômica. São Paulo (SP): Associação Brasileira de Empresas de Pesquisa ABEP; 2008. Disponível em: <http://www.abep.org>.

13. Dawoodbhoy, I., Delgado-Ângulo, E. K., & Bernabé, E. (2013). Impact of malocclusion on the quality of life of Saudi children. *Angle Orthodontist, 83*(6).

Revista ARACÊ
ISSN: 2358-2472

14. Davey-Smith, G., Blane, D., & Bartley, M. (1994). Explanations for socioeconomic differentials in mortality: evidence from Britain and elsewhere. *European Journal of Public Health, 4*, 131–144.

15. Esperão, P. T. (2006). Qualidade de vida associada à saúde bucal em pacientes ortocirúrgicos. [Tese]. Rio de Janeiro, RJ: Universidade do Estado do Rio de Janeiro.

16. Feitosa, S., Colares, V., & Pinkham, J. (2005). The psychosocial effects of severe caries in 4-year-old children in Recife, Pernambuco, Brazil. *Cadernos de Saúde Pública, 21*, 1550–1556.

17. Fernandes, L. M. L. F., Moura, F. M. P., Gamaliel, K. S., & Corrêa-Faria, P. (2013). Dental caries and need of orthodontic treatment: Impact on the quality of life of children. *Pesquisa Brasileira em Odontopediatria e Clínica Integrada, 13*(1), 37–43.

18. Feu, D., Miguel, J. A. M., Celeste, R. K., & Oliveira, B. H. (2013). Effect of orthodontic treatment on oral health–related quality of life. *Angle Orthodontist*, 1–7.

19. Foster-Page, L. A., Thomson, W. M., Jokovic, A., & Locker, D. (2005). Validation of the child perceptions questionnaire (CPQ 11-14). *Journal of Dental Research, 84*, 649–652.

20. Goursand, D., Paiva, S. M., Zarzar, P. M., Pordeus, I. A., Grochowski, R., & Allison, P. J. (2009). Measuring parental-caregiver perceptions of child oral health-related quality of life: psychometric properties of the Brazilian version of the P-CPQ. *Brazilian Dental Journal, 20*, 169–174.

21. Hamamci, N., Başaran, G., & Uysal, E. (2009). Dental Aesthetic Index scores and perception of personal dental appearance among Turkish university students. *European Journal of Orthodontics, 31*, 168–173.

22. Heravi, F., Farzanegan, F., Tabatabaee, M., & Sadeghi, M. (2011). Do malocclusions affect the oral health-related quality of life? *Oral Health & Preventive Dentistry, 9*(3).

23. Jenny, J., & Cons, N. C. (1996). Comparing and contrasting two orthodontic indices, the Index of Orthodontic Treatment Need and the Dental Aesthetic Index. *American Journal of Orthodontics and Dentofacial Orthopedics, 110*(4), 410–416.

24. Jokovic, A., Locker, D., Stephens, M., Kenny, D., Tompson, B., & Guyatt, G. (2002). Validity and reliability of a questionnaire for measuring child oral-health-related quality of life. *Journal of Dental Research, 81*, 459–463.

25. Locker, D., Jokovic, A., & Tompson, B. (2005). Health-related quality of life of children aged 11 to 14 years with orofacial conditions. *Cleft Palate-Craniofacial Journal, 42*, 260–266.

26. Martins, M. A. T. S. (2008). Confiabilidade e validade da versão brasileira do child perceptions questionnaire (CPQ 8-10). Tese (Mestrado em Odontopediatria), Universidade Federal de Minas Gerais, Belo Horizonte.

Revista ARACÊ
ISSN: 2358-2472

27. O'Brien, C., Benson, P. E., & Marshman, Z. (2007). Evaluation of a quality of life measure for children with malocclusion. *Journal of Orthodontics, 34*, 185–193.

28. Organização Mundial da Saúde – OMS. (1997). *Oral health surveys: basic methods* (4th ed.). Geneva.

29. Onyeaso, C. O. (2003). An assessment of relationship between self-esteem, orthodontic concern, and dental aesthetic index (DAI) scores among secondary school students in Ibadan, Nigeria. *International Dental Journal, 53*, 79–84.

30. Peres, K. G., Traebert, E. S. A., & Marcenes, W. (2002). Diferenças entre autopercepção e critérios normativos na identificação das oclusopatias. *Revista de Saúde Pública, 36*(2), 230–236.

31. Petersen, P. E., Bourgeois, D., Ogawa, H., Estupinan-Day, S., & Ndiaye, C. (2005). The global burden of oral diseases and risks to oral health. *Bulletin of the World Health Organization, 83*(9), 661–669.

32. Shaw, W. C., Addy, M., & Ray, C. (1980). Dental and social effects of malocclusion and effectiveness of orthodontic treatment: a review. *Community Dentistry and Oral Epidemiology, 8*, 36–45.

33. Sardenberg, F., Martins, M. T., Bendo, C. B., Pordeus, I. A., Paiva, S. M., Auad, S. M., & Vale, M. P. (2013). Malocclusion and oral health-related quality of life in Brazilian school children: A population-based study. *Angle Orthodontist, 83*(1).

34. Stenvik, A., Espeland, L., Linge, B. O., & Linge, L. (1997). Lay attitudes to dental appearance and need for orthodontic treatment. *European Journal of Orthodontics, 19*, 271–277.

35. Taylor, K. R., Kiyak, A., Huang, G. J., Greenlee, G. M., Jolley, C. J., & King, G. J. (2009). Effects of malocclusions and its treatment on the quality of life of adolescents. *American Journal of Orthodontics and Dentofacial Orthopedics, 136*, 382–392.

36. Torres, C. S., Paiva, S. M., Vale, M. P., Pordeus, I. A., Ramos-Jorge, M. L., Oliveira, A. C., & Allison, P. J. (2009). Psychometric properties of the Brazilian version of the Child Perceptions Questionnaire (CPQ11–14) – short forms. *Health and Quality of Life Outcomes, 7*, 43.

37. World Health Organization – WHO. (2003). *The World Oral Health Report 2003. Continuous improvement of oral health in the 21st century – The approach of the WHO Global Oral Health Programme*. Geneva: World Health Organization.

38. World Health Organization – WHO. (1997). *Oral Health Surveys: Basic Methods*. Geneva, Switzerland: World Health Organization.

39. Zhang, M., McGrath, C., & Hagg, U. (2009). Orthodontic treatment need and oral health-related quality among children. *Community Dental Health, 26*, 58–61.

Revista ARACÊ
ISSN: 2358-2472

40. Almeida, A. B., Leite, I. C. G., Melgaço, C. A., & Marques, L. S. (2014). Dissatisfaction with determinant factors. *Dental Press Journal of Orthodontics, 19*(3), 120–126.