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ARQUIVOS EM ODONTOLOGIA

Malocclusion negatively impacted the oral health-related quality of life of children of low socioeconomic status

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Aim: This study assessed whether the presence of malocclusion had a negative impact on the oral health-related quality of life (OHRQoL) of eight to ten-year-old children of low socioeconomic status.

Methods: A cross-sectional study was conducted with a total of 111 children, eight to ten years of age, randomly selected from public schools from Diamantina, MG, Brazil. The number of children was determined by a sample size calculation. Two calibrated examiners performed clinical oral examinations for the diagnosis of malocclusion, dental caries experience, and traumatic dental injuries following the Dental Aesthetic Index (DAI), the World Health Organization (WHO), and Andreasen's classification, respectively. The Brazilian version of the Child Perceptions Questionnaire (CPQ_{8-10}) was applied to evaluate the OHRQoL. Descriptive and bivariate ($p < 0.05$) analyses were also performed.

Results: Children had a mean age of 8.89 ± 0.82 years, of which 52.3% were female. The prevalence of malocclusion was 62.2%. Significant differences were found in emotional ($p = 0.045$) and social ($p = 0.017$) well-being subscale scores as well as in the total CPQ_{8-10} ($p = 0.022$) scores between children with and without malocclusion.

Conclusion: The presence of malocclusion negatively impacted the OHRQoL of children aged eight to ten years of age of a low socioeconomic status.

Uniterms: Child. Malocclusion. Pediatric dentistry. Quality of life.

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INTRODUCTION

Facial esthetics plays a central role in how society perceives people and how they recognize themselves[1]. Dental appearance is a fundamental component of facial esthetics. Malocclusion can be defined as a craniofacial growth and development disorder affecting dental occlusion[2]. It can be considered as a public health issue, since it has a high prevalence and presents possibility of prevention and treatment[3,4].

In this context, systematic reviews have shown that malocclusion has a negative impact on the oral health-related quality of life (OHRQoL) of children and adolescents, mainly in dimensions of emotional and social well-being[5,6]. Severe malocclusions in the esthetic zone, such as anterior crowding, diastema mediale, and increased overjet, are the main types of malocclusions that mostly compromise the OHRQoL of such individuals[5]. The appraisal of the impact of oral health problems on the OHRQoL

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can help in recognizing needs, selecting the best therapies, supervising patients' progress, and clarifying to clinicians the benefits obtained from the management of oral conditions[7,8].

Most studies reporting the impact of malocclusion on OHRQoL have been carried out in developed countries and with adolescents in permanent dentition[1,9]. However, children with mixed dentition can also present malocclusions[9,10]. In this age group, children are in a central phase of growth and development[11], and the self-image molded in childhood is related to future behavior and personality development[12]. In addition, a large part of orthodontic patients usually initiate treatment during pre-adolescence, thus justifying the need to draw attention to patients within this age group[13]. In fact, the few studies conducted with children in mixed dentition phase have shown an association between the presence of malocclusion and a worse OHRQoL[9,14-16], and its correction has proven to have a positive impact on the OHRQoL of treated individuals[17,18].

Therefore, this study aimed to assess the impact of malocclusion on the OHRQoL of eight to ten-year-old children of low socioeconomic status.

MATERIALS AND METHODS

The present report conforms to guidelines from Strengthening the Reporting of Observational Studies in Epidemiology (STROBE Statement).

STUDY DESIGN AND SAMPLE SIZE CALCULATION

A cross-sectional study was carried out with children randomly selected from public schools in the city of Diamantina, MG, Brazil. This city possesses a Human Development Index of 0.716 and a Gini index of 0.571[19,20]. The children were from families of a low socioeconomic status (mean monthly income < $240). Sample size calculation was performed using Epi Info™ 6.04 software (Centers for Disease Control and Prevention, Druid Hills, GA), considering a 95% confidence interval, an 80% power, and an expected loss of 20%. In addition, a prevalence of 40% was assumed. This value corresponded to the highest frequency among the evaluated oral health problems (dental trauma, dental caries, and malocclusion) found during the pilot study. Thus, the final sample necessary to meet the required calculations consisted of 112 children.

ELIGIBILITY CRITERIA

Inclusion criteria established that children had to be eight to ten years of age, regularly enrolled in a public school. Children with a previous history of orthodontic treatment, presenting systemic problems or psychological disorders were excluded. Those children who did not collaborate during the clinical assessment and/or questionnaire application were also excluded.

CALIBRATION PROCESS AND PILOT STUDY

The calibration process consisted of two phases. First, a researcher who is specialist in pediatric dentistry (MLRJ) conducted the theoretical phase, comprised of the presentation and discussion of the criteria established for the diagnosis of malocclusion, dental caries, and traumatic dental injuries. Photographs of clinical cases were also analyzed. An exercise in how to use the OHRQoL instrument was conducted. Next, a calibration between the two examiners and the specialist was performed by orally examining the eight to ten-year-old children, who were not participants in this study. After seven days, the same children were examined again to assess intra-examiner stability. Agreement between the examiners (minimal Kappa value = 0.87) was determined for each oral health problem evaluated in this study.

A pilot study was performed on nine children (who did not participate in the main study) to test the methodology and to verify the criteria's reliability. No misunderstandings about the questionnaire were found and changes in methods were not required.

NON-CLINICAL DATA COLLECTION

Non-clinical data, inclusing children's age and gender, were collected by using a sociodemographic questionnaire. In addition, the Brazilian version of the Child Perceptions Questionnaire (CPQ_{8-10})[21] was applied to assess the impact of malocclusion on the children's OHRQoL.

The CPQ_{8-10} consists of 25 items addressing the impact of dental conditions on the OHRQoL of children distributed among four subscales: oral symptoms, functional limitations, emotional well-being, and social well-being. Each child was interviewed individually. Initially, two additional general questions on oral health were asked and extended to find out the degree

to which the children's well-being was affected. For the question: "How would you describe the condition of your teeth and mouth?", the responses options were: "very good", scoring 0; "good", scoring 1; "fair", scoring 2; or "bad", scoring 3. For the question "How much do your teeth and mouth bother you?", the response options were: "not at all", scoring 0; "very little/ almost never", scoring 1; "a little", scoring 2; or "a lot", scoring 3. Afterwards, the children were asked to respond to the 25 questions addressing the frequency of events in the previous month, for example: "In the past month, how often have you had a hard time biting or chewing food like apples, corn on the cob, or steak because of your teeth or mouth?" and "In the past month, how often have you tried not to smile or laugh with other children because of your teeth or mouth?". The response options and scores for these questions were: "never", scoring 0; "once or twice", scoring 1; "sometimes", scoring 2; "often", scoring 3; and "every day or almost every day", scoring 4. The CPQ_{8-10} scores were computed for each of the four subscales as well as for the total CPQ_{8-10} score. The total score can range from 0 to 100, with higher scores indicating a greater negative impact on the children's OHRQoL[22].

CLINICAL DATA COLLECTION

Two calibrated examiners performed the clinical oral examination in the school. Children were examined while seated on a school chair, under natural light, using tongue depressors. All biosafety norms were strictly followed.

The Dental Aesthetic Index (DAI)[23] was used to assess specific types of malocclusion (missing teeth, diastema, crowding of anterior teeth, greater upper anterior irregularity, greater lower anterior irregularity, upper anterior overbite, lower anterior overbite, anterior open bite, and anterior-posterior molar relation). The posterior crossbite was also evaluated. Children were classified as "without malocclusion" (DAI ≤ 25) or "with malocclusion" (DAI ≥ 26). Since the children were in the mixed dentition phase, they were also asked about the reason for any missing teeth (exfoliation, missing teeth due to dental caries, dental trauma, or agenesis).

Some prevalent dental conditions were also assessed to control confounding effects in the statistical analyses. TDIs were diagnosed following an established classification[24], and children were classified as "with dental trauma" or "without dental trauma". Dental caries experience was diagnosed using the WHO criteria[25] and recorded as "without dental caries experience" or "with dental caries experience".

DATA ANALYSIS

Data analyses were performed in the Statistical Package for Social Sciences (SPSS for Windows, version 21.0, SPSS Inc., Chicago, IL, USA) software. Descriptive statistic and frequency distribution were determined. The Kolmogorov-Smirnov test was used to assess the normality of data distribution. As the data were not normally distributed, the non-parametric Mann-Whitney U-test was used to determine associations between the presence of malocclusion and the negative impact on the children's OHRQoL. The level of significance was set to 5% ($p < 0.05$).

ETHICAL ISSUES

This study received approval from the Human Research Ethics Committee of the Federal University of Vales do Jequitinhonha and Mucuri, Brazil (process number 086/09) and was carried out in compliance with international statutes and national legislation on ethics in research involving human subjects. All children consented to participation, and their parents or caregivers signed an informed consent form.

RESULTS

A total of 111 eight to ten-year-old children were enrolled in this present study. The mean age was of the children 8.89 ± 0.82 years, in which 52.3% were female. The response rate was 99.1%. Participants were excluded if the questionnaire was not filled out completely (n = 1). The presence of malocclusion was found in 62.2% of the children (n = 69).

In general, 64.0% (n = 71) of the children described their teeth and mouth as fair/bad, while 56.7% (n = 63) responded that their teeth and mouth disturbed them a little/a lot (Table 1).

Table 1 - Frequency distribution of the responses to global questions of oral health of the Child Perceptions Questionnaire (CPQ_{8-10})

Global questions of oral health	n (%)
How would you describe the condition of your teeth and mouth?	
Very good	12 (10.8)
Good	28 (25.2)
Fair	64 (57.7)
Bad	7 (6.3)
How much do your teeth and mouth bother you?	
Not at all	26 (23.4)
Very little/almost never	22 (19.8)
A little	42 (37.8)
A lot	21 (18.9)

Children with malocclusion presented higher mean and median scores for all subscales and total CPQ_{8-10} scores than those children without malocclusion. However, children with and without malocclusion presented significant differences in emotional ($p = 0.045$) and social ($p = 0.017$) well-being subscales scores, as well as in the total CPQ_{8-10} ($p = 0.022$) scores, indicating a negative impact on the children's OHRQoL (Table 2).

Dental caries experience was also significantly ($p < 0.001$) associated with the total CPQ_{8-10} scores. On the other hand, traumatic dental injuries did not impact the children's OHRQoL ($p = 0.231$) (Table 2).

Table 2 - Descriptive distribution of total Child Perceptions Questionnaire (CPQ_{8-10}) scores, and subscales and associations between children with and without malocclusion

	Mean CPQ_{8-10} score (SD) without malocclusion	Mean CPQ_{8-10} score (SD) with malocclusion	Possible range	Observed range without malocclusion	Observed range with malocclusion	p*
CPQ_{8-10} subscales						
Oral symptoms	5.95 (3.39)	7.09 (3.84)	0–20	0–14	0–17	0.117
Functional limitation	3.45 (3.53)	4.26 (3.43)	0–20	0–13	0–12	0.149
Emotional well-being	3.83 (4.29)	5.25 (4.38)	0–20	0–15	0–16	**0.045**
Social well-being	3.62 (4.54)	5.48 (4.93)	0–40	0–18	0–20	**0.017**
Total CPQ_{8-10} score	16.90 (12.96)	22.51 (13.38)	0–100	0–54	1–53	**0.022**

*Mann-Whitney test
SD: Standard deviation

DISCUSSION

This present study evaluated the impact of malocclusion on the OHRQoL of eight to ten-year-old children of low socioeconomic status. Some of the methodological aspects of this present study, such as the determination of sample size, the random selection of children, examiner calibration, and the pilot study, as well as the use of validated tools for data collection, give credibility to the results[11]. Moreover, few studies have investigated the impact of malocclusion on the OHRQoL of children between eight to ten years of age[8-10,14-16], highlighting the originality and importance of this study.

In the present study, children were from families of a low socioeconomic status. The

effect of social, cultural, and economic status on OHRQoL has also been investigated, mainly for older individuals[26,27]. Few studies have evaluated the association between socioeconomic status and OHRQoL within a specific sample[28]. This is an important issue, since the environment has an influence on one's health behavior and perceptions regarding oral health[28,29].

The prevalence of malocclusion in this study was 62%. Other studies with Brazilian eight to ten-year-old children found a prevalence ranging from 16.5% to 78.7%.[8,9] The wide variation in prevalence rates could reflect methodological differences between studies. Furthermore, researchers[9] have stated that the high prevalence of malocclusion could be related to functional habits that are harmful to the primary dentition, as well as to the development of malocclusion intrinsic to the mixed dentition phase[9]. These aspects reinforce the need for further studies on this issue.

The present study showed an association between the presence of malocclusion and a worse emotional and social well-being. This result is in accordance with other studies in the field[8-10,15,16]. One study also found an impact of malocclusion upon oral symptoms[14]. This study reported that severe malocclusions in the anterior region are more responsible for the negative impact on the OHRQoL[5]. The anterior region is directly related to one's dental appearance, and consequently to facial esthetics; therefore, children with malocclusion may feel less attractive than their counterparts who have aligned teeth. In this sense, authors also argue that malocclusion plays a significant role in social acceptance and interpersonal relationship due to esthetic reasons, also reflecting on psychological aspects[1,10].

The findings of the present study indicated that malocclusion exerted a negative impact on the OHRQoL of children, which was confirmed in the association between the presence of malocclusion and total CPQ_{8-10} scores. A meta-analysis attested to the clear association between the presence of malocclusion with a negative impact on the OHRQoL in children and adolescents between eight and 18 years of age, although the overall impact seems small[6]. These authors suggested that the older the children got, the more malocclusions negatively affected the OHRQoL, with first signs of this becoming apparent in children near eight years of age[6]. This is an important aspect, and pediatric dentists and orthodontists should therefore consider the evaluation of subjective criteria (such as OHRQoL) when determining the treatment plan of their patients. This will help them to achieve a more holistic approach.

The present study has some limitations, such as the cross-sectional nature of the study design, which impedes the establishment of causal inference. Although DAI is a reliable measure to assess malocclusion, it was designed to be applied in individuals with permanent dentition; hence, there may be a tendency to undervalue the results in the mixed dentition[9]. Longitudinal studies are necessary to evaluate the long-term effects of malocclusion on the OHRQoL of children.

CONCLUSION

The presence of malocclusion had a negative impact on the OHRQoL of children aged eight to ten years of age of a low socioeconomic status.

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Maloclusão impactou negativamente a qualidade de vida relacionada à saúde bucal de crianças de baixo nível socioeconômico

Objetivo: Este estudo avaliou se a presença de maloclusão impactou negativamente a qualidade de vida relacionada à saúde bucal (QVRSB) de crianças de oito a dez anos de idade de baixo nível socioeconômico.

Métodos: Um estudo transversal foi conduzido com um total de 111 crianças de oito a dez anos de idade selecionadas aleatoriamente em escolas públicas de Diamantina, Brasil. O número de crianças foi determinado por cálculo amostral. Dois examinadores calibrados realizaram exames clínicos bucais para o diagnóstico de maloclusão, experiência de cárie dentária e lesões dentárias traumáticas após o Índice de Estética Dental (DAI), Organização Mundial da Saúde (OMS) e classificação de Andreasen, respectivamente. A versão brasileira do *Child Perceptions Questionnaire* (CPQ_{8-10}) foi aplicada para avaliar a QVRSB. Foram realizadas análises descritivas e bivariadas ($p < 0,05$).

Resultados: As crianças tinham média de idade de 8,89 ± 0,82 anos, sendo 52,3% do sexo feminino. A prevalência de maloclusão foi de 62,2%. Foram encontradas diferenças significativas nos escores das subescalas de bem-estar emocional ($p = 0,045$) e social ($p = 0,017$), como também nos escores totais do CPQ_{8-10} ($p = 0,022$) entre crianças com e sem maloclusão.

Conclusão: A presença de maloclusão impactou negativamente a QVRSB de crianças de oito a dez anos de idade de baixo nível socioeconômico.

Descritores: Criança. Má oclusão. Odontopediatria. Qualidade de vida.