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QUALITY OF LIFE AND AESTHETIC PERCEPTION OF DENTAL CARIES

Qualidade de vida e percepção estética da cárie dentária

Calidad de vida y la percepción estética de la caries dental

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ABSTRACT

Objective: To relate the aesthetic perception and the oral health-related quality of life in the presence of dental caries in schoolchildren.

Methods: Cross-sectional study carried out in Araraquara, São Paulo, Brazil, from October 2014 to March 2015, with 260 schoolchildren aged 8 to 10 years, divided into clinical groups according to the presence of dental caries. The Child Perceptions Questionnaire and the Child Questionnaire About Teeth Appearance were applied and a clinical evaluation of permanent and deciduous dentition was conducted for detection of decayed, missing or filled teeth. Data was analyzed using the chi-square test and Mann-Whitney's test, $p \leq 0.05$. **Results:** Of the 260 students, 130 (50%) had caries disease, with the highest frequency (62.0%) in 8-year-olds. Socioeconomic variables, such as lower family income and lower maternal schooling, were associated with the dental caries group ($p < 0.05$ and $p < 0.01$, respectively). In the dental caries group, the domains oral symptoms (4.9 vs 6.6), emotional well-being (3.0 vs 4.7) and social well-being (2.2 vs 3.5) were higher than in the caries-free group. Regarding the aesthetic perception, the psychological domain (0.94 vs 1.27) and the overall perception of oral health (2.26 vs 2.93) were higher in the group with dental caries. In the linear regression, there was a significant contribution of the number of permanent decayed teeth and the dmft (decayed, missing and filled deciduous teeth) index to the worst perception of quality of life. **Conclusion:** Dental caries negatively affects aesthetic perception and quality of life in 8- to 10-year-old children.

Descriptors: Quality of Life; Esthetics; Dental; Child; Dental Caries.

RESUMO

Objetivo: Relacionar a percepção estética e a qualidade de vida relacionada à saúde bucal na presença de cárie dentária em escolares.

Métodos: Estudo transversal realizado em Araraquara, São Paulo, Brasil, entre outubro de 2014 e março de 2015, com 260 escolares, de 8 a 10 anos, divididos em grupos clínicos segundo a presença de cárie dentária. Utilizaram-se questionários "Child Perceptions Questionnaire" e "Child Questionnaire About Teeth Appearance" e avaliação clínica para detecção de dentes cariados, perdidos ou obturados em dentes permanentes e decíduos. Dados analisados através do teste qui-quadrado e Mann Whitney, $p \leq 0.05$. **Resultados:** Dos 260 escolares, 130 (50%) apresentavam a doença cárie, com maior frequência (62,0%) na faixa etária 8 anos. Variáveis socioeconômicas, como menor renda familiar e menor escolaridade da mãe, estiveram associadas ao grupo com cárie ($p < 0,05$ e $p < 0,01$ respectivamente). No grupo com cárie, os domínios sintomas orais (4,9 vs 6,6), bem-estar emocional (3,0 vs 4,7) e bem-estar social (2,2 vs 3,5) foram maiores que no grupo sem cárie. Com relação à percepção estética, o domínio psicológico (0,94 vs 1,27) e a percepção geral de saúde bucal (2,26 vs 2,93) se apresentaram maiores no grupo com cárie. Na regressão linear, observou-se contribuição significativa dos números de dentes permanentes cariados e o índice ceo-d (dentes decíduos cariados, extraídos e obturados) na pior percepção de qualidade de vida. **Conclusão:** A cárie dentária afeta negativamente a percepção estética e a qualidade de vida em crianças de 8 a 10 anos.

Descritores: Qualidade de Vida; Estética Dentária; Criança; Cárie Dentária.



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RESUMEN

Objetivo: Relacionar la percepción estética y la calidad de vida relacionada con la salud bucal de escolares con caries dental. **Métodos:** Estudio transversal realizado en Araraquara, São Paulo, Brasil, entre octubre de 2014 y marzo de 2015 con 260 escolares entre 8 y 10 años que fueron divididos en grupos clínicos según la presencia de caries dental. Se utilizaron los cuestionarios “Child Perceptions Questionnaire” y “Child Questionnaire About Teeth Appearance” y la evaluación clínica para detectar los dientes con caries, los perdidos u con obturaciones en dientes permanentes y deciduos. Los datos fueron analizados a través de las pruebas Chi-cuadrado y Mann Whitney con $p \leq 0,05$. **Resultados:** Entre los 260 escolares, 130 (50%) tenían caries con más frecuencia en la franja de edad de 8 años (62,0%). Las variables socioeconómicas como la menor renta familiar y menor escolaridad de la madre se asociaron con el grupo que tenía caries ($p < 0,05$ y $p < 0,01$ respectivamente). Los dominios síntomas orales (4,9 vs 6,6), el bien estar emocional (3,0 vs 4,7) y el bien estar social (2,2 vs 3,5) fueron mayores en el grupo con caries que el grupo sin caries. Respecto la percepción estética, el dominio psicológico (0,94 vs 1,27) y la percepción general de salud bucal (2,26 vs 2,93) se presentaron mayores en el grupo con caries. A partir de la regresión lineal se observó la contribución significativa de los números de dientes permanentes con caries y el índice ceo-d (dientes deciduos con caries, extraídos y con obturación) para la peor percepción de calidad de vida. **Conclusión:** La caries dental afecta de manera negativa la percepción de la estética y la calidad de vida de niños entre 8 y 10 años.

Descriptores: Calidad de Vida; Estética Dental; Niño; Caries Dental.

INTRODUCTION

Contemporary concepts of oral health suggest that this should be a part comprised in the overall health and in well-being. Oral health is multifaceted and includes, without limitation, the ability to speak, smile, smell, taste, touch, chew, swallow and transmit a variety of emotions, through facial expressions, with confidence and without pain, or discomfort, and without disorders of the craniofacial complex. The oral condition reflects the physiological, social and psychological features that form the essence of quality of life and is influenced by experiences, perceptions, expectations and ability to adapt to ever changing circumstances⁽¹⁾.

Dental caries is the most prevalent oral disease and, although in decline, it still affects 56%⁽²⁾ of the Brazilian population at 12 years of age. Because this is a multifactorial condition, it must be understood considering its functional and psychosocial impact.

The promotion of oral health during childhood is essential, since the impacts of caries disease are not only related to the ongoing experiences, but also to oral health experiences of the past and to lifelong implications⁽³⁾. Self-care from the childhood years implies better oral health in adult life and less biopsychosocial impact⁽⁴⁾ beliefs about oral health care (held by individuals and their parents: In addition to the clinical examination, the assessment of Oral Health-related Quality of Life (OHRQoL)⁽⁵⁾ and the evaluation of aesthetic perception⁽⁶⁾ measure the functional and psychosocial impacts of oral diseases, helping professionals in the comprehensive understanding of the patient.

In the assessment of the OHRQoL, aspects such as functional impact, oral symptoms, social well-being and emotional well-being are evaluated⁽⁵⁾, and the literature points out a strong association between the presence of dental caries and impacts on the quality of life in children^(6,7), especially in the presence of untreated carious lesions⁽⁴⁾ beliefs about oral health care (held by individuals and their parents and in a situation of social vulnerability^(7,8)).

The evaluation of aesthetic perception considers individual self-reported aspects related to appearance, tooth color, tooth positioning, and to the oral health and its impact on satisfaction with appearance⁽⁶⁾. Even though some points are presented in the OHRQoL, the extent of this impact is not clearly addressed, so that research in this area should be encouraged for understanding of the full extent of the disease.

Thus, to better understand the complexity of caries disease, the objective of this research was to relate aesthetic perception and oral health quality of life to the presence of dental caries in schoolchildren.

METHODS

The development of this cross-sectional study occurred from October 2014 to March 2015, in the city of Araraquara, São Paulo, Brazil.

Data was collected from public and private schools, and children aged between 8 and 10 years, enrolled in middle school during that year, were invited to participate in the study, stratified into public (217) and private (43) schoolchildren. Convenience sampling was adopted.

After the draw, seven schools were selected, totalizing 406 schoolchildren whose parents authorized the participation in the study. As inclusion criteria, schoolchildren should be enrolled in middle school, be literate, aged between 8 and 10 years, and

be authorized by their legal guardians and agree to participate as volunteers. Exclusion criteria were: presence of anterior teeth with fracture due to trauma, schoolchildren affected by enamel defects, and the use of orthodontic appliances. Thus, a total of 260 students were included in the analyses.

The present study was carried out in three stages: (i) contact with those responsible for the students; (ii) application of the questionnaires addressing OHRQoL and aesthetic perception; (iii) dental clinical examination.

The first stage was carried out with use of information provided by the schools included in the study. In this phase, the parents were sent the authorization form for participation in the survey and the questionnaire for collection of socioeconomic variables through semistructured questions based on the National Household Sample Survey (*Pesquisa Nacional de Amostra por Domicílio - PNAD*)⁽⁹⁾.

In the second stage, the Child Perceptions Questionnaire (CPQ), in its long version with 29 questions for children aged 8 to 10 years⁽⁸⁾, and the Child Perceptions Questionnaire about Teeth Appearance (CQATA), with 5 questions divided into 12 subitems⁽⁸⁾, validated in the Portuguese language⁽⁹⁾.

The CPQ is a set of measurement instruments, validated in the Portuguese language⁽¹⁰⁾, which takes into account cognitive skills and everyday life. This instrument covers four domains: oral symptoms, functional limitations, emotional well-being and social well-being.

CQATA has been translated into Brazilian Portuguese language and the version was validated⁽⁶⁾, and includes physical, psychological and social questions, as well as perceptions about color changes and other aesthetic-related features, with multiple-choice answers to its items and subitems.

CPQ and CQATA were applied in the classroom, in a printed version, prior to the clinical examination under the supervision of the researchers. The children answered the questions individually. The higher the score totaled by adding the multiple choice responses, the greater the impact of oral health on the quality of life and aesthetic perception of the child⁽¹¹⁾.

In the third stage, a single examiner, previously trained for the detection of decayed, missing or filled teeth in permanent dentition and decayed and filled teeth in deciduous dentition, according to World Health Organization criteria⁽¹²⁾, using the DMFT ($\kappa = 0.88$) and dmft ($\kappa = 0.92$) indices, respectively, conducted a clinical assessment of the children.

For statistical analysis, the sample was divided according to the clinical groups: control group (absence of dental caries) and case group (presence of dental caries), divided by means of the data obtained according to the DMFT and dmft indices. Statistical packages SPSS, version 22.0, were used for the statistical analysis of the study, with the significance level set at $\alpha = 0.05$. The CPQ and CQATA scores were abnormal after being verified by means of the Kolmogorov-Smirnov test. Partitioning Chi-squared tests were adopted to verify the distribution of the sample according to the independent variables (sex, age, school) for each clinical group. The socioeconomic variables were dichotomized and the clinical characteristics were related with use of the chi-squared test.

Considering the available response alternatives, the sum of the CPQ and CQATA scores for each domain of the instrument was performed. The missing or lost data were counted by the mean obtained in the domain for each individual⁽¹³⁾. Mann Whitney's test was used to verify the difference in the CPQ and CQATA domains, according to the clinical characteristics.

The association between the means of all domains of both questionnaires and seven other factors was measured by linear regression. The following factors were selected: number of decayed and filled deciduous teeth; number of decayed, missing and filled permanent teeth; and the DMFT and dmft indices. The effective variables entered the model when $p \leq 0.05$, using the stepwise method.

The ethical aspects were respected during the development of the present research, which was submitted to evaluation by the Research Ethics Committee of the School of Dentistry of Araraquara, São Paulo State University (*CEP-FOAR-UNESP*), and was conducted only after approval, according to Resolution 466/12 of the National Health Council (Aproval no. 070020/2013).

RESULTS

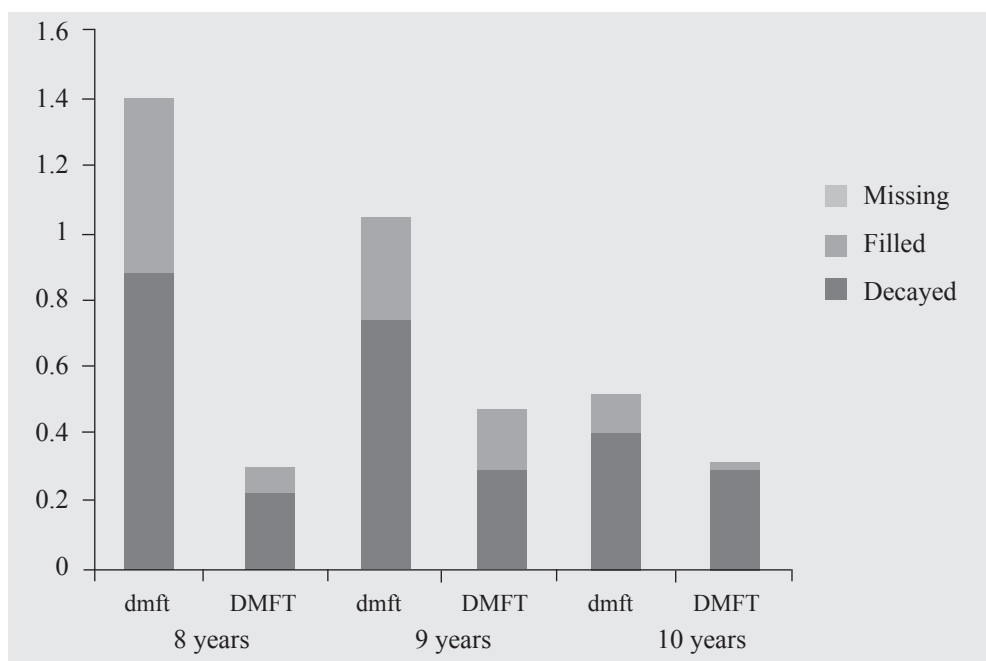
Half of the evaluated sample presented caries disease (50.0%/n=130), with the highest frequency found in 8-year-old children (62.0%), as shown in Table I. Among schoolchildren with caries disease, the dmft index was 1.03 and DMFT was 0.37. In Figure 1, the dmft and DMFT indices are divided into decayed, missing and filled teeth, according to age.

In Table II, the presence of caries disease in the case group was associated with socioeconomic variables: family income below three minimum wages and maternal schooling below complete middle school.

Table I - Distribution of the sample according to sex, age, school and clinical subgroups, control (DMFT/dmft = 0) and case (DMFT/dmft ≠ 0). Araraquara, São Paulo, 2014-2015.

	Clinical Groups	
	Control	Case
n (%)	130 (50.0)	130 (50.0)
Sex		
Male	61 (51.7)	57 (48.3)
Female	69(48.6)	73 (51.4)
Age		
8	35 (38.0)	57 (62.0) ^a
9	49 (51.0)	47 (49.0) ^{ab}
10	46 (63.9)	26 (36.1) ^b
School		
Public	102 (47.0)	115 (53.0)
Private	28 (65.1)	15 (34.9)
		^a p<0.05

DMFT/dmft: number of decayed, missing and filled teeth, permanent and deciduous. ^a Chi-squared test; ^b Chi-squared partition test.



Legend: DMFT/dmft: number of decayed, missing and filled teeth, respectively permanent and deciduous.

Figure 1 - DMFT and dmft according to the number of decayed, missing and/or filled teeth, according to age. Araraquara, São Paulo, 2014-2015.

Table II - Socioeconomic variables related to the clinical groups, control (DMFT/dmft = 0) and case (DMFT/dmft ≠ 0). Araraquara, São Paulo, 2014-2015.

Variables	Control	Case	p
Family income			
Less than 3 minimum wages	82 (45.1)	100 (54.9)	p<0.05 ^a
Above 3 minimum wages	42 (60.9)	27 (39.1)	
Paternal schooling			
Illiterate up to complete middle school	80 (47.6)	88 (52.4)	
Incomplete high school up to higher education	35 (61.4)	22 (38.6)	
Maternal education			
Illiterate up to complete middle school	10 (27.8)	26 (72.2)	p<0.01 ^a
Incomplete high school up to higher education	115 (53.2)	101 (46.8)	

DMFT/dmft: number of decayed, missing and filled teeth, permanent and deciduous. ^aChi-squared test.

In Table III, the differences between the clinical groups, control and case, and the domains of the CPQ 8-10 can be observed. In the total score (12.3 vs 17.6), oral symptoms (4.9 vs 6.6), emotional well-being (3.0 vs 4.7) and social well-being (2.2 vs 3.5), the case group presented higher values than the control group (p<0.05).

Also in Table III, when comparing the clinical groups, case and control, to the CQATA, it was observed that, in the clinical case group, the overall perception of oral health (2.26 vs 2.93), psychological domain (0.94 vs 1.27), perception of appearance (1.76 vs 2.14) and perception of dental health (1.36 vs 1.89) were higher than in the control group (p<0.05).

The linear regression results (Table IV) show an association between dmft and the number of decayed permanent teeth with the domains of the questionnaires, and that, for each additional decayed permanent tooth, there is an average increase of 1.0 in CPQ emotional and social well-being, and 0.5 in the CQATA overall perception of oral health.

Table III - Mean (± SD) of CPQ and CQATA domains according to the clinical groups, control (DMFT/dmft = 0) and case (DMFT/dmft ≠ 0). Araraquara, São Paulo, 2014-2015.

Domains	Clinical Groups		p
	Control n=130	Case n=130	
Domains of CPQ₈₋₁₀			
CPQ8-10 total score [0-100]	12.3 (10.5)	17.6 (14.9)	p<0.001
Oral symptoms [0-20]	4.9 (3.2)	6.6 (4.1)	p<0.001
Functional limitations [0-20]	2.2 (2.7)	2.9 (3.4)	
Emotional well-being [0-20]	3.0 (3.5)	4.7 (5.1)	p<0.01
Social well-being [0-40]	2.2 (3.6)	3.5 (5.0)	p<0.05
Domains of CQATA			
General perception of oral health [0-9]	2.26 (2.26)	2.93 (2.46)	p<0.05
Physical domain [0-3]	0.82 (1.00)	1.03 (1.12)	
Psychological domain [0-3]	0.94 (0.99)	1.27 (1.14)	p<0.05
Social domain [0-3]	0.50 (0.97)	0.62 (1.01)	
Perception of appearance [0-5]	1.76(1.30)	2.14 (1.40)	p<0.05
Perception of dental position [0-5]	2.70 (1.44)	2.59 (1.52)	
Perception of dental color [0-5]	2.13 (1.22)	2.27 (1.31)	
Perception of dental health [0-5]	1.36 (1.22)	1.89 (1.44)	p<0.05
Satisfaction with appearance [0-4]	1.41 (0.98)	1.37 (1.18)	

DMFT/dmft: number of decayed, missing and filled teeth, permanent and deciduous; CPQ (Child Perceptions Questionnaire); CQATA (Child Perceptions Questionnaire about Teeth Appearance); []: possible score deviation. The higher the score, the more negative the oral health-related quality of life and the aesthetic perception. Mann Whitney's Test.

Table IV - Stepwise regression analysis: independent variables as predictors of the CPQ (Child Perceptions Questionnaire) and CQATA (Child Perceptions Questionnaire about Teeth Appearance). Araraquara, São Paulo, 2014-2015.

	Regression analysis B [95% CI]	p-value	R ²
CPQ			
Total score			
dmft	1.405 [0.457-2.353]	0.004	0.056
Decayed permanent teeth	2.263 [0.040-4.486]	0.046	0.056
Oral symptoms			
dmft	0.395 [0.122 -0.668]	0.005	0.031
Functional limitations			
dmft	0.296 [0.073 -0.518]	0.010	0.026
Emotional well-being			
dmft	0.465 [0.148 – 0.781]	0.004	0.068
Decayed permanent teeth	1.002 [0.260 – 1.745]	0.008	0.068
Social well-being			
Decayed permanent teeth	1.027 [0.283 – 1.770]	0.007	0.044
Filled deciduous teeth	0.668 [0.034 – 1.303]	0.039	0.044
CQATA			
General perception of oral health			
Decayed permanent teeth	0.577 [0.169- 0.984]	0.006	0.029
Physical domain			
Decayed permanent teeth	0.213 [0.030 – 0.397]	0.023	0.020
Psychological domain			
Decayed permanent teeth	0.329 [0.145 - 0.512]	0.001	0.046
dmft	0.134 [0.035 - 0.233]	0.008	0.027
Perception of coloration			
Filled deciduous teeth	0.205 [0.020 – 0.389]	0.030	0.018
Perception of dental health			
dmft	0.166 [0.068 – 0.263]	0.001	0.042

CPQ: *Child Perceptions Questionnaire*; CQATA: *Child Perceptions Questionnaire about Teeth Appearance*; dmft: number of decayed, missing and filled deciduous teeth.

DISCUSSION

Caries is a multifactorial disease, which is not limited to an alteration of the dental structure⁽¹⁴⁾ caries (International Caries Detection and Assessment System, ICDAS II. This disease causes painful symptomatology and alterations in oral language⁽¹⁵⁾ missing, and filled teeth--D-DMFT in permanent teeth or d-dfnt in primary teeth, as well as affects the quality of life and aesthetic perception, in result of the signs and symptoms presented, as observed in the present study.

Associating the OHRQoL and aesthetic perception measurements with clinical oral health indicators allows one to evaluate the individual's oral health needs. The literature suggests that, when adopted together, they may benefit dental service planning, since clinical findings alone frequently overestimate the patient's needs⁽¹⁴⁾. Moreover, sociodental indicators can be used to prioritize dental treatment in situations of paucity of resources. According to this reasoning, if there no impact is found on the quality of life or aesthetic perception, there is no need for immediate clinical intervention, and the patient can be referred to an oral health education program⁽¹⁴⁾.

Thus, the present study evaluated the relationship between the presence of previous or current caries history and the type of school attended, family income and parental schooling, and found significant associations with family income below 3 minimum wages ($p<0.05$) and with maternal schooling lower than the middle school ($p<0.01$). This link between health and socioeconomic outcomes can be explained by the fact that family income has a direct effect on the capability to access goods, services and other resources that promote health, in addition to the impacts on psychosocial and psychological resources⁽⁴⁾.

The social and psychological coping skills of children are undergoing development, so it is necessary to expand the investigations about the impact of oral health on children's quality of life⁽¹⁶⁾. Therefore, the present study covered the age group of 8 to 10 years, presenting a significant prevalence of caries (50%), with a significant impact on the OHRQoL in the domains

oral symptoms and emotional and social well-being, with stronger associations found in the presence of decayed permanent teeth and higher dmft indices according to linear regression.

The association between worse OHRQoL indices and dental caries has also been reported in Southern Brazil, in a survey of 1,528 Brazilian children aged 12 years. The presence of one single carious cavity has already been associated with a worse OHRQoL⁽¹⁷⁾. In the same study, an oral impact on daily activities was observed in children with decayed teeth with cavity, due to oral symptoms such as toothache, bad breath and food impaction⁽¹⁷⁾.

With the proximity of adolescence, the children's concern about their aesthetic appearance becomes more significant, as evidenced by the study carried out in Rio de Janeiro, with 571 students. The adolescents presenting decayed anterior teeth had the domain of aesthetic perception, according to the Child-Oral Impacts on Daily Performance (COIDP) questionnaire, more affected⁽¹⁸⁾. Children who suffered functional limitation on eating or some emotional compromise due to dental caries had an improvement in their quality of life after receiving dental treatment⁽¹⁷⁾.

Results similar to those found in the studies of Southern Brazil⁽¹⁷⁾ and Rio de Janeiro⁽¹⁸⁾ were found in the present study. By linear regression, it was observed that, for each additional decayed permanent tooth, there is an average increase of 1.0 in the domains of emotional and social well-being with respect to quality of life, and a 0.5 increase in the overall perception of oral health in relation to aesthetic perception.

Also in Brazil, a study carried out with 167 students aged 08 to 14 years, from public schools in Piracicaba, SP, observed that the experience of oral diseases and disorders, as well as psychological phenomena such as anxiety and depression, influenced the OHRQoL⁽¹⁸⁾; additionally, the presence of untreated dental caries and its consequences measured by means of the PUFA/pufa index produced impacts on all domains of CPQ 8-10⁽¹⁹⁾.

In the present study, the overall perception of oral health, mainly in the psychological domain, perception of appearance and perception of dental health, was worse in the group with dental caries (case). As it was observed in a study of 861 4-year-old children, in which the ones with severe caries reported most frequently that they feel pain or are saddened by their teeth, when compared to caries-free children⁽²⁰⁾. In addition, parents or guardians of children with caries reported that their children were ashamed to smile because of their teeth (31.2%), while some of them (9.1%) had stopped playing with other children for the same reason⁽²⁰⁾.

Dental surgeons recognize that aesthetic impairment negatively affects the social and psychological development of the child⁽²¹⁾. However, dental treatments in Brazil, despite experiencing a rise, are not available to the entire population. A total of 29.6 million people (18.7% of the Brazilian population) have never visited the dentist, with the highest proportions in children younger than 4 years old (85.6%)⁽²²⁾.

The need to promote oral health from an early age is vital, since oral health programs in primary care can produce very meaningful changes. Like the one found in children frequently exposed to oral health programs in the first years of life, among which there was a lower frequency of caries and a better quality of life⁽²¹⁾.

The longitudinal study, conducted in the Netherlands with 6,990 children followed from birth, observed that children with severe caries at 6 years of age were more likely to present a lower OHRQoL at 10 years of age. The study highlighted the importance of oral health during childhood, because those with an early oral health impairment are much more likely to follow a path that will lead to poor oral health⁽³⁾.

However, the present study presents a convenience sampling and without a population-based approach. Despite indicating a direction, its results should be read with caution. The use of the DMFT and dmft indices also limits the interpretation of the data, since the extent and severity of carious lesions have not been evaluated. Therefore, further research should be conducted in order to guide public policies aimed at children's oral health.

CONCLUSION

It is concluded that dental caries affects both the oral health-related quality of life and the aesthetic perception, in children aged 8 to 10 years.

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CONFLICTS OF INTEREST

The authors declare that there was no conflict of interest in the execution of this research.

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