

Impact of dental caries on the quality of life of preschoolers measured by PedsQL questionnaire

Adriana Vasconcelos da Nóbrega (<http://orcid.org/0000-0002-6781-6042>)¹
Lucia de Fátima Almeida de Deus Moura (<http://orcid.org/0000-0002-4112-1533>)²
Natália Silva Andrade (<http://orcid.org/0000-0001-5945-8401>)¹
Cacilda Castelo Branco Lima (<http://orcid.org/0000-0002-2977-6035>)¹
Danielle Gomes Dourado (<http://orcid.org/0000-0002-0730-618X>)³
Marina de Deus Moura de Lima (<http://orcid.org/0000-0002-7641-6331>)⁴

Abstract *The objective of this study was to evaluate the impact of dental caries on the quality of life of preschool children. The population was made up of preschoolers aged 5 years, enrolled in public and private institutions of Teresina, PI, Brazil. The Pediatric Quality of Life Inventory (PedsQL™) was applied to children and caregivers, as well as a socioeconomic-demographic questionnaire for those responsible. In the dental examination the ceod index was used to evaluate the caries experience. Of the 566 children examined, 50.2% presented with caries experience. It was observed an association between caries experience and poorer quality of life in the oral health domain in the children's perception (RR = 0.981, 95% CI = 0.97-0.99) and parents (RR = 0.955, 95% CI = 0.94-0.97). According to the children's perception, caries in the posterior teeth was associated with poorer quality of life in the physical capacity domain (RR = 0.985, 95% CI = 0.97-0.99). It was concluded that caries experience had a negative impact on the OHRQoL (oral health-related quality of life) in children's oral health according to the perception of children and parents. Caries located in molars had a negative impact on HRQoL in the physical ability domain according to the children's perception.*

Keywords *Collective health, Epidemiology, Dental caries.*

¹ Universidade Federal do Piauí (UFPI). Campus Universitário Ministro Petrônio Portella, Ininga. 64049-550 Teresina PI Brasil.

nobregaav@gmail.com

² Departamento de Patologia e Clínica Odontológica, Universidade Federal do Piauí (UFPI). Teresina PI Brasil.

³ Centro de Ciências da Saúde, Universidade Federal do Piauí (UFPI). Teresina PI Brasil.

⁴ Departamento de Patologia e Clínica Odontológica, Universidade Federal do Piauí (UFPI). Teresina PI Brasil.

Introduction

A declining prevalence of dental caries has been observed in the last decades in Brazil. This phenomenon has been attributed mainly to the increased availability and use of fluoride products by a large part of the population and also to the current focus on health promotion and prevention of oral health policies¹⁻⁴. However, caries is still a prevalent and unevenly distributed disease, and its control poses a challenge to public health. Socioeconomic factors have been associated with both the caries experience and its distribution among children^{5,6}.

Most dentistry studies have a quantitative approach, evaluating the presence and severity of diseases, without assessing how these problems interfere in the quality of life of the individuals affected by them *vis-à-vis* pain, discomfort and psychological impact^{7,8}.

The concept of oral health-related quality of life (OHRQoL) refers to the impact of oral health or disease on the performance of the individual's daily activities, well-being or quality of life⁹. The evaluation of the OHRQoL is a vital health tool, both in the traditional clinical evaluation and in research^{10,11}. Studies that evaluate the impact of oral health on the quality of life of children can contribute to the planning of public health policies that aim to reduce social inequalities and should be based on knowledge of the needs of the population, by correlating causes.

A significant number of these studies use the methodology of specific questionnaires that do not cover systemic aspects related to the general health conditions of the children and caregivers studied, limiting the analytical process on the broad realms of health. In the proposed study, a questionnaire was applied to those responsible to obtain socioeconomic-demographic data. A Pediatric Quality of Life Inventory (PedsQL™) tool was applied to children and their caregivers¹².

Also, it is crucial to explore the perceptions of parents about the oral health of their children, since they may affect preventive care and the use of dental services provided to these children¹³. Studies with this approach are still scarce in children¹⁻⁴. This is the first research that uses the PedsQL™ questionnaire with preschoolers. Thus, this study aims to evaluate the impact of dental caries on the quality of life of preschoolers in Teresina (PI), Brazil, which is relevant to the academy and society. The study hypothesizes that preschoolers with dental caries have a more significant adverse impact on quality of life.

Methods

The Research Ethics Committee (CEP) of the Federal University of Piauí analyzed and approved this study, observing the guidelines of Resolution 466/12 of the National Health Council¹⁴.

Type of Study

This is a cross-sectional study with data from the database of a research project entitled “*Impact of enamel development defects on the quality of life of preschoolers.*” This paper was drafted in accordance with the guidelines of “Strengthening the reporting of observational studies in epidemiology” (STROBE). Data were collected from June to December 2014.

Population and Sample

The study population consisted of preschoolers aged five years, enrolled in public and private institutions in the city of Teresina (PI), Brazil, making a total of 7,792 enrolled preschoolers. The sample of the study was of probabilistic and random nature, and was calculated using the equation $n = z^2 \cdot p \cdot (1 - p) / e^2$, where “z” is the quantile of normal distribution (for a confidence interval of 95%, $z = 1.96$); “p” is the estimated variation for dental caries negative impact on quality of life (50%); and “e” is the margin of error considered (5%). Then, the Cochran correction for finite populations was applied, $n = n_0 / (1 + n_0 / N)$, where n_0 is the initial sample size, and N is the size of the population (7,792 preschoolers). An ideal sample of 365 children was obtained for the development of the study. Since it was a multistage sample, the design effect was corrected by a factor of 1.5 ($365 \times 1.5 = 547$). The sample size was increased by 10% to minimize losses during data collection, with a final sample of 602 ($547 + 55 = 602$) preschoolers.

Preschoolers were drawn up by regional superintendence (central/north, south, east and southeast) of Teresina (PI) and by type of preschools (public and private) from the nominal list provided by the Municipal Education and Culture Secretariat of Teresina (PI) and the Union of Private Schools of Teresina (PI). In each school, children were drawn from the school attendance list. When participation in the research was not permitted by the preschool, this preschool was replaced by another from the same superintendence. If the preschool drawn was not

able to complete the defined sample, another was drawn until the number of children targeted was reached. The study included 19 municipal public preschools and 21 public preschools.

Inclusion and Exclusion Criteria

We included 5-year-old preschoolers who were in the deciduous dentition phase and who had at least two deciduous incisors present in each dental arch.

Preschoolers in permanent dentition phase and children with special needs were excluded due to their inability to respond to quality of life questionnaires, which assess the self-perception of children in the analyzed age range, a requirement of the tool used. Children's special needs were informed by teachers.

Data Collection and Analysis

Data were collected through the application of sociodemographic questionnaires to the children's caregivers, the validated quality of life tool (applied to the caregivers and children) and the intra-oral clinical examination (Figure 1).

Variables Used in the Study

Variables collected in the questionnaire responded by parents about sociodemographic aspects were gender, living with father and mother in the same house, type of school, daily teeth brushing, weekly intake of sweets and history of previous dental injuries. Concerning those responsible, they were household income and both parents' schooling.

Variables verified in the oral clinical examination were caries experience, location requires treatment. Variables analyzed in the validated tool were physical capacity, emotional aspect, social aspect, school activity, children's oral health.

Calibration

The calibration exercise was conducted in two phases. The theoretical and practical steps involved the discussion of the diagnostic criteria for caries according to the dmft index. At this stage, we analyzed photos of teeth with and without caries of patients attended at the Children's Clinic of the UFPI. The theoretical-practical calibration phase was coordinated by a pe-

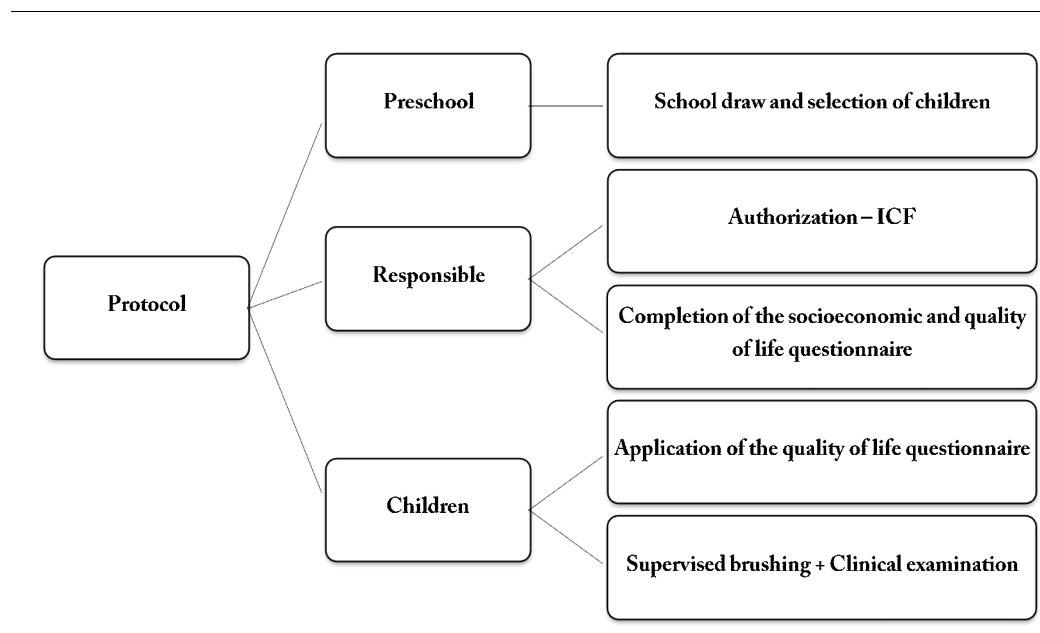


Figure 1. Study flowchart

Source: Author's elaboration.

diatric dentistry expert, who is the gold standard for evaluation. When the examiner and the gold standard agreed on 80% of the assessments, the second phase of the calibration was initiated. The second phase included clinical tests of 60 patients with a 15-day interval between tests. The observed intra-examiner kappa was 0.86, and the inter-examiner kappa was 0.82.

Pilot study

Initially, a pilot study was carried out in 3 daycare centers (2 public and one private), corresponding to 10% of the final sample (60 children). These children were not included in the final survey sample. The objectives of the pilot study were the adequacy of the research methodology and evaluation of reliability and validity of the quality of life questionnaire for this study through Cronbach's alpha tests and test-retest (Coefficient of Intraclass Variation)¹⁵. The values observed were 0.724 for Cronbach's alpha and 0.726 for the test-retest. No changes were made to the initial project.

Socioeconomic-demographic characteristics

Sociodemographic characteristics of the sample, such as information on gender, household income, mother and father education, brushing frequency, type of school and history of dental injuries were collected through a questionnaire filled out by those in charge.

Quality of Life Questionnaire (PedsQL)

The general quality of life related to oral health was evaluated using the Brazilian version of the Pediatric Quality of Life Inventory (PedsQL) questionnaire applied to those responsible and 5-year-old children¹². The PedsQL™ Oral Health Scale questionnaire, PedsQL™ 4.0 Generic Core Scales has two versions, one aimed at evaluating the self-perception of children in the 5-7 years age group and another for the perception of those responsible; both consider multidimensional aspects of children's health.

The PedsQL™ 4.0 Generic Core Scales questionnaire consists of 23 items divided into four realms: physical capacity (8 items), emotional aspect (5 items), social aspect (5 items), and school activity (5 items), and the *PedsQL™ Oral Health Scale* questionnaire consists of 5 items. A 5-point scale was used in answers of the questionnaire

for the responsible, as follows: 100=never a problem; 75=almost never a problem; 50=sometimes a problem; 25=often a problem; and 0 = almost always a problem. A simplified facial hedonic scale was used to facilitate the use of this scale for children, containing only three responses, corresponding to: 100=never a problem; 50=sometimes a problem; and 0=almost always a problem^{15,16}. The lower the score on the questionnaire, the worse the quality of life, and the higher the score, the better the quality of life.

Oral clinical examination

In the last stage of data collection, we performed a clinical examination to evaluate the dental caries experience. This clinical evaluation was conducted within the educational institution in which the child was enrolled, by a single examiner previously trained and calibrated for dental caries (Kappa Index value greater than 0.60). Initially, teeth were cleaned with a toothbrush and fluoridated toothpaste. The test was carried out in the classroom and artificial light was used (Pelican® model – Startec with 127V, São Paulo, Brazil). The children sat in the chair and their heads were positioned on the examiner's lap. Sterile gauze was used to dry the teeth and clinical examination was performed with a flat mouth mirror (Golgran®, São Paulo, Brazil), exploratory catheter N° 5 (Golgran®, São Paulo, Brazil) and CPI catheter (Golgran®, São Paulo, Brazil). Clinical diagnosis of dental caries was performed using the dmft¹⁷ index, which includes the sum of the number of deciduous decayed teeth, with indicated extraction and sealing.

Statistical Analysis

Data were analyzed through the Statistical Package for the Social Science (SPSS® for Windows, version 20.0, Armonk, NY, USA: IBM Corp.) program. Descriptive data analysis was performed through frequencies, mean and standard deviation. The tool's scores (PedsQL) were analyzed as quantitative variables using Poisson regression with a robust variance to determine the relationship between quality of life and independent variables. In the multivariate analysis, the variables with a value of $p \leq 0.20$ in the bivariate analysis were included. The results were expressed by Rate Ratio (RR) and 95% confidence interval (95% CI), and the associations with a $p < 0.05$ remained in the model. The significance level $\alpha = 5\%$ was considered in all analyses.

Results

The final sample consisted of 566 (94.0%) of the 602 pre-established children. On the day of the examination, 17 (2.8%) children were absent, and 15 (2.5%) were older than 05 years. Four children diagnosed with autism spectrum disorder (0.7%) were excluded according to the eligibility criteria. The socioeconomic data and oral health habits of respondents are described in Table 1.

Of the children participating in the sample, 50.2% had a caries experience, and 14.4% had only affected front teeth, 45.1% only back teeth and 40.5% both front and back teeth. Regarding the distribution of the need for treatment, only 3.5% did not require treatment (Table 1).

In the perception of children, it was observed that individuals with a household income lower than two minimum wages evidenced worse quality of life according to the physical capacity and oral health realms. Schooling of parents of less than eight years was associated with poorer quality of life in the oral health realm. Also, we observed that carious lesions located in back teeth affected the quality of life in the physical capacity realm (Table 2).

The multivariate analysis related to the association between socioeconomic profile, habits, caries experience and location of carious lesions on the realms of quality of life are described in Table 3. Female gender was associated with a worse quality of life in the physical capacity realms (RR=0.983, 95% CI = 0.97-0.99) and emotional aspect (RR=0.984, 95% CI = 0.98-0.99). Household income of less than two minimum wages, lower parental schooling and dental caries experience were associated with poorer quality of life in the oral health aspect of children ($p < 0.05$).

In the perception of parents, an association between caries experience and children's oral health scale was observed in the PedsQL™ questionnaire ($p < 0.001$) (Table 4).

According to the parents' perception, children with a dental caries experience were 5% less likely to have a better quality of life in the children's oral health scale (RR = 0.955, 95% CI = 0.94-0.97) (Table 5).

According to the parents' perception, an association between caries experience and poorer quality of life was observed in children's oral health realm (Table 5).

Table 1. Socioeconomic profile, habits, caries experience and location of Teresina (PI) preschoolers.

Variables	N	%
Gender		
Male	301	53.2
Female	265	46.8
Household income (minimum wages)		
< 2 MW	382	67.5
≥ 2 MW	184	32.5
Maternal schooling (years of study)		
≤ 8 years	150	26.5
> 8 years	416	73.5
Paternal schooling (years of study)		
≤ 8 years	203	35.9
> 8 years	363	64.1
No	9	1.6
Living with father and mother in the same house		
Yes	398	70.3
No	168	29.7
School type		
Municipal	380	67.1
Private	186	32.9
How many times do children brush their teeth daily?		
1	58	10.2
2	312	55.1
≥ 3	196	34.6
Intake of sweets		
Up to twice a week	299	52.8
3 times or more a week	267	47.2
History of previous dental injuries		
Yes	95	16.8
No	471	83.2
Caries' experience		
Yes	284	50.2
No	282	49.8
Location (N=284)		
Front teeth	41	14.4
Back teeth	128	45.1
Front and back teeth	115	40.5
Requires treatment (N=284)		
Yes	274	96.5
No	10	3.5

Source: Direct research.

Discussion

The knowledge of data on the effects of oral diseases on the oral health-related quality of life of preschoolers is of great importance since it allows

Table 2. Bivariate analysis of children's quality of life realms according to socioeconomic profile, habits, caries' experience and location in Teresina (PI) preschoolers.

Variables*	Physical capacity		Emotional aspect		Social aspect		School activity		Children oral health	
	μ	SD	μ	SD	μ	SD	μ	SD	μ	SD
Gender										
Male	70.93	17.91	67.18	24.19	70.13	21,13	70,5	21,65	74,15	23,32
Female	66.01	17.82	59.66	25.84	72.19	20,85	71,74	20,93	72,49	26,01
P-value	0.003		< 0.001		< 0.001		< 0.001		0.495	
Household income (minimum wages)										
< 2MW	66.66	18.23	61.26	25.76	70.34	21,14	69,84	22,67	70,47	25,62
≥ 2MW	72.72	16.89	68.64	23.39	72.66	20,7	73,64	17,93	79,4	21,17
P-value	0.033		0.124		0.292		0.688		0.003	
Maternal schooling (years of study)										
≤ 8 years	63.88	17.72	58.87	26.46	66.93	22,16	65,67	21,47	64,47	26,13
> 8 years	70.34	17.84	65.38	24.58	72.6	20,39	73,03	20,93	76,59	23,24
P-value	0.102		0.101		0.617		0.249		<0.001	
Paternal schooling (years of study)										
≤ 8 years	65.21	18.42	61.72	25.48	68.57	22,81	68,92	23,14	67,44	25,65
> 8 years	70.54	17.53	64.74	25.07	72.51	19,82	72,29	20,14	76,69	23,39
P-value	0.028		0.379		0.507		0.769		0.001	
Caries' experience										
Yes	67.45	18.97	63.49	25.9	71.62	22,13	71,16	21,93	68,77	26,54
No	69.81	16.96	63.83	24.59	70.57	19,83	70,99	20,69	78,01	21,57
P-value	0.119		0.871		0.551		0.925		< 0.001	
Caries' location										
Front	75.89	20.28	64.76	29.94	74.76	20,4	78,57	18,78	74,29	29,25
Back	66.78	18.74	63.38	25.61	71.37	22,28	70,57	22,09	68,33	26,32
P-value	0.029		0.876		0.657		0.211		0.340	

*Poisson test. μ=mean. S=standard deviation.

an understanding about the influence of conditions that affect oral health in their lives and families. Also, it contributes to a greater understanding of social inequalities and their effects on the identification of groups with more significant needs and the implementation of public health programs that prioritize the prevention of dental caries and other oral health care for children¹⁸⁻²¹. The perception of parents and caregivers has been used to evaluate the quality of life of their children. Parents and caregivers are considered reliable when assessing OHRQoL of children 5-6 years of age^{4,22}. A similar result was found in our study, in which the parents of children with caries experience perceive that their children have worse quality of life in the children's oral health score. By investigating the impact of dental car-

ies on the quality of life of preschoolers and their parents/caregivers, with emphasis on the type of tooth and the stage of lesion²³, Ramos-Jorge et al.²³ verified that most carious lesions were in an advanced stage and were located in both front and back teeth. Naidu et al.²⁴ also observed in their study that the most significant negative impacts were found in children with higher caries severity. In this study, we noted that the presence of caries in back teeth was associated with poorer quality of life in the physical capacity realm, and this may be due to the sensitivity and pain in back teeth when carious, impairing chewing, leading to difficulty in ingesting hot or cold drinks, and even sleeping problems. Also, other authors state that the impact on quality of life of children with caries experience may be based on psychological

Table 3. Multivariate analysis of the quality of life realms of children according to socioeconomic profile, habits, caries' experience and location in Teresina (PI) preschoolers.

Variables*	Physical capacity		Emotional aspect		Social aspect		School activity		Children oral health	
	RRa	(CI 95%)	RRa	(CI 95%)	RRa	(CI 95%)	RRa	(CI 95%)	RRa	(CI 95%)
Gender										
Male	1		1		0.986 (0.976-0.998)		0.988 (0.977-0.988)		-	
Female	0.983 (0.972-0.994)		0.984 (0.976-0.993)		1		1.012 (1.002-1.022)			
P-value	0.003		0.012		0.010		0.032			
Household income (minimum wages)										
< 2MW	0.987 (0.975-0.999)		-		-		-		0.979 (0.978-0.996)	
≥ 2MW	1								1	
P-value	0.041								0.002	
Maternal schooling (years of study)										
≤ 8 years	-		-		-		-		0.985 (0.976-0.993)	
> 8 years									1	
P-value									< 0.001	
Paternal schooling (years of study)										
≤ 8 years	-		-		-		-		0.986 (0.979-0.994)	
> 8 years									1	
P-value									0.012	
Caries' experience										
Yes	-		-		-		-		0.981 (0.974-0.989)	
No									1	
P-value									> 0.001	
Caries' location										
Front	1		-		-		-		-	
Back	0.985 (0.974-0.997)									
P-value	0.047									

*Poisson regression. RRa=rate ratio. CI95%=95% confidence interval.

Table 4. Bivariate analysis of the quality of life realms of children as per perception of parents according to caries' experience and location of Teresina (PI) preschoolers.

Variables	Physical capacity		Emotional aspect		Social aspect		School activity		Children oral health	
	μ	SD	μ	SD	μ	SD	μ	SD	μ	SD
Caries' experience										
Yes	79.50	19.29	68.49	19.05	78.71	20.76	67.27	21.26	85.25	16.97
No	82.57	18.72	73.26	17.13	83.35	17.98	72.48	19.10	93.26	10.11
P-value	0.382		0.265		0.645		0.412		<0.001	
Caries' location										
Front	76.04	21.77	66.90	15.77	74.05	23.59	66.19	17.46	87.14	16.17
Back	79.78	19.10	68.61	19.31	79.09	20.53	67.36	21.56	85.10	17.06
P-value	0.498		0.498		0.358		0.706		0.550	

*Poisson test. μ =mean. S=standard deviation.

Table 5. Multivariate analysis of the quality of life realms of children as per perception of parents according to caries' experience and location of Teresina (PI) preschoolers.

Variables	Physical capacity	Emotional aspect	Social aspect	School activity	Children oral health
	RRa (CI 95%)	RRa (CI 95%)	RRa (CI 95%)	RRa (CI 95%)	RRa (CI 95%)
Caries' experience					
Yes					0.955 (0.941-0.969)
No	-	-	-	-	1
P-value	< 0.001				
Caries' location					
Front					
Back	-	-	-	-	-
P-value					

*Poisson regression. RRa=rate ratio. CI95%=95% confidence interval.

factors, since children with severe caries recall their poor experiences regarding pain and anxiety in the treatment^{2,17,25}.

The high incidence and prevalence of dental caries in preschoolers justified the development of this research because there is still a lack of information on the subject regarding statistical data from the city of Teresina, as well as on the impact of dental caries on the quality of life of preschoolers. However, longitudinal studies are necessary to determine the cause-effect relationship between caries and quality of life.

In a systematic review of the literature by Barbosa and Gavião²⁶, authors concluded that there is a relationship between oral health and OHRQoL in children. Conditions such as dental caries, fluorosis and malocclusion have a negative impact on children's quality of life. However, au-

thors suggested that studies to evaluate other oral conditions should be performed to maximize the validity of the tools. Similar results were found in other studies^{2,26-29}.

Our study evidenced a high prevalence of dental caries in the sample, and it was possible to identify that 50.2% had a caries experience, and only 14.6% had affected front teeth, 45.1% only back teeth and 40.6% both front and back teeth. These data corroborate data found in the *SB Brasil*³⁰, in which the mean of dmft at the age of 5 years is 2.55, and 56.7% had a caries experience in the city of Teresina (PI). When assessing the association between caries experience and the realms of children's quality of life in their perceptions, only the oral health realm of the children had a significant difference ($p>0.001$) concerning the existence of caries, considering the vari-

able gender. We observed an association between the realms physical capacity, emotional aspect, social aspect and school activity and gender of the children, showing that the characteristics of gender can affect the physical, social and psychological conditions of the children.

A study conducted by Martins Júnior et al.³¹ concluded that the household income variable did not influence the presence of caries in the children of that study, differing from this study, in which we observed that children had worse OHRQoL in households with income of less than two minimum wages.

Parents or guardians must be aware of conditions that affect their children's oral health, but this is not always possible, because it may be related to their educational level. This study found that children of parents with a higher level of schooling had better oral health and quality of life. This result corroborates that found by Gomes et al.⁴ and Martins et al.³² and counters Firmino et al.³³. It is vital to promote oral health during childhood, as risk factors such as a diet rich in sugars, poor oral hygiene and unfavorable socioeconomic conditions may contribute to increased likelihood of negative impact on the quality of life³⁴⁻³⁸.

An association between caries experience and poorer quality of life in the oral health realm was observed in both children's and parents' perceptions. Parents who know dental caries have children with lower prevalence rates, differing from what was found in Firmino et al.³³ study, in which no significant differences were found in oral health conditions and quality of life of children where parents had a history of prior knowledge about caries and went to the dentist regularly. Considering that most dental consultations fo-

cus on cure⁹, it is crucial to establish educational actions geared to parents to prevent oral diseases from childhood.

The validated Brazilian version of the PedsQL™ questionnaire was used because it allows comparisons between perceptions of those in charge and children, besides facilitating longitudinal evaluation of the quality of life related to general and oral health¹². Also, the scores of this tool were analyzed as quantitative variables through Poisson regression with robust bivariate and multivariate variance, as performed in previous studies^{39,40}.

As a subjective assessment, PedsQL allows parents/guardians to be more aware of the impact of oral problems on their children since preschoolers' oral health is often neglected or left backstage. Children with untreated caries experience pain, as well as difficulties in chewing, sleeping and socializing, with possible effects on self-esteem, growth, weight gain and quality of life^{8,20,38,41}. This study is relevant because the results can increase the awareness of parents/guardians and stimulate more effective promotion and prevention measures through public oral health policies since it uses parents' and guardians' perceptions, showing more concrete data on the impact of oral problems on the routine of preschoolers.

Conclusion

Dental caries experience negatively impacted oral health quality of life on the oral health scale of preschoolers in the PedsQL questionnaire, according to the perception of children and their parents.

Collaborations

AV Nóbrega worked on the conception, research, methodology and final writing; LFAD Moura worked on the conception and final writing; NS Andrade worked on the research and methodology; CCB Lima worked on the research and methodology; DG Dourado worked on the final writing; MDM Lima worked on the conception, research, methodology and final writing.

References

1. Wong HM, Mcgrath CPJ, King NM, Lo ECM. Oral Health-Related Quality of Life in Hong Kong Pre-school Children. *Caries Research* 2011;45(4):370-376.
2. Kramer PF, Feldens CA, Ferreira SH, Bervian J, Rodrigues PH, Peres MA. Exploring the impact of oral diseases and disorders on quality of life of pre-school children. *Community Dent Oral Epidemiol* 2013;41(4):327-335.
3. Scarpelli AC, Paiva SM, Viegas CM, Carvalho AC, Ferreira FM, Pordeus IA. Oral health-related quality of life among Brazilian preschool children. *Community Dent Oral Epidemiol* 2013;41(4):336-344.
4. Gomes MC, Pinto-Sarmento TCDA, Costa EMMDB, Martins CC, Granville-Garcia AF, Paiva SM. Impact of oral health conditions on the quality of life of pre-school children and their families: a cross-sectional study. *Health Qual Life Outcomes* 2014;18(12):55-67.
5. Pereira SM, Tagliaferro EP, Ambrosano GM, Cortelazzi KL, Meneghim MC, Pereira AC. Dental caries in 12-year-old schoolchildren and its relationship with socioeconomic and behavioural variables. *Oral Health Prev Dent* 2007;5(4):299-306.
6. Traebert J, Guimarães LA, Durante EZ, Serratine AC. Low maternal schooling and severity of dental caries in Brazilian preschool children. *Oral Health Prev Dent* 2009;7(1):39-45.
7. Cerveira JA. *Influência da qualidade de vida na ocorrência da doença carie em pré-escolares* [mestrado]. São Paulo: Escola de enfermagem de Ribeirão Preto - Universidade de São Paulo; 2003.
8. Feitosa S, Colares V. As repercussões da cárie precoce na infância na qualidade de vida de pré-escolares. *JBP Rev Ibero-Am Odontopediatr Odontol Bebê* 2003;6(34):542-548.
9. Slade GD, Strauss RP, Atchison KA, Kressin NR, Locker D, Resine ST. Conference summary: assessing oral health outcomes – measuring health status and quality of life. *Community Dent Health* 1998;15(1):3-7.
10. Pahel, BT, Rozier RG, Slade GD. Parental perceptions of children's oral health: the Early Childhood Oral Health Impact Scale (ECHOIS). *Health Qual Life Outcomes* 2007;5(6):1-10.
11. Sischo L, Broder HL. Oral health-related quality of life: what, why, how and future. *J Dent Res* 2011;90(11):1264-1270.
12. Bendo CB, Paiva SM, Viegas CM, Vale MP, Varni JW. The PedsQL™ Oral Health Scale: feasibility, reliability and validity of the Brazilian Portuguese version. *Health Qual Life Outcomes* 2012;10:42-53.
13. Talekar BS, Rozier RG, Slade GD, Ennett ST. Parental perceptions of their preschool-aged children's oral health. *J Am Dent Assoc* 2005;136(3):364-372.
14. Brasil. Ministério da Saúde. Conselho Nacional de Saúde. Resolução nº 466, de 12 de dezembro de 2012. Brasília: DOU nº 12, Seção 1, 2012.
15. Varni JW, Seid M, Kurtin PS. PedsQL 4.0: reliability and validity of the Pediatric Quality of Life Inventory version 4.0 generic core scales in healthy and patient populations. *Med Care* 2001;39(8):800-812.
16. Steele MM, Steele RG, Varni JW. Reliability and validity of the PedsQL™ Oral Health Scale: measuring the relationship between child oral health and health-related quality of life. *Child Health Care* 2009;38:228-244.

17. WHO. *The World Oral Health Report. Continuous improvement of oral health in the 21st century – The approach of the WHO Global Oral Health Programme*. Geneva: World Health Organization; 2003.
18. Fernandes IB, Pereira TS, Souza DS, Ramos-Jorge J, Marques LS, Ramos-Jorge ML. Severity of Dental Caries and Quality of Life for Toddlers and Their Families. *Pediatr Dent* 2017;39(2):118-123.
19. Kragt L, Van Der Tas JT, Moll HA, Elfrink ME, Jad-doe VW, Wolvius EB, Ongkosuwito EM. Early Caries Predicts Low Oral Health-Related Quality of Life at a Later Age. *Caries Res* 2016;50(5):471-479.
20. Lee GH, Mcgrath C, Yiu CK, King NM. Translation and validation of a Chinese language version of the Early Childhood Oral Health Impact Scale (ECHO-HIS). *Int J Paediatr Dent* 2009;19(6):399-405.
21. Ferreira SH, Béria JU, Kramer PF, Feldens EG, Feldens CA. Dental caries in 0- to 5-year-old Brazilian children: prevalence, severity, and associated factors. *Int J Paediatr Dent* 2007;17(4):289-296.
22. Abanto J, Tsakos G, Paiva SM, Raggio DP, Celiberti P, Bonecker M. Agreement between children aged 5–6 years and their mothers in rating child oral health-related quality of life. *Int J Paediatr Dent* 2014; 24(5):373-379.
23. Ramos-Jorge J, Alencar BM, Pordeus IA, Soares MEC, Marques LS, Ramos-Jorge ML, Paiva SM. Impact of dental caries on quality of life among preschool children: emphasis on the type of tooth and stages of progression. *Int J Paediatr Dent* 2014;24(5):373-379.
24. Naidu R, Nunn J, Donnelly-Swift E. Oral health-related quality of life and early childhood caries among preschool children in Trinidad. *BMC Oral Health* 2016;16(1):128.
25. Peres MA, De Oliveira Latorre MDOR, Sheiham A, Peres KG, Barros FC, Hernandez PG, Maas AM, Romano AR, Victora CG. Social and biological early life influences on severity of dental caries in children aged 6 years. *Community Dent Oral Epidemiol* 2005;33:53-63.
26. Barbosa TS, Gaviao MB. Oral health-related quality of life in children: part II. Effects of clinical oral health status. A systematic review. *Int J Dent Hyg* 2008;6(2):100-107.
27. Chaffee BW, Kramer PF, Vitolo MR, Feldens CA. Oral health-related quality-of-life scores differ by socio-economic status and caries experience. *Community Dent Oral Epidemiol* 2017;45(3):216-224.
28. Guerra MJC, Greco RM, Leite ICG, Ferreira EF, Paula MVQ. Impacto das condições de saúde bucal na qualidade de vida de trabalhadores. *Ciê Saude Colet* 2014;19(12):4777-4786.
29. Lopes MWF, Gusmão ES, Alves RV, Cimões R. Impacto das doenças periodontais na qualidade de vida. *RGO - Rev Gaúcha Odontol* 2011;59(supl. 0):39-44.
30. Brasil. Ministério da Saúde. SB Brasil 2010: *Pesquisa Nacional de Saúde Bucal: resultados principais*. Brasília: Ministério da Saúde; 2012.
31. Martins-Júnior PA, Vieira-Andrade RG, Corrêa-Faria P, Oliveira-Ferreira F, Marques LS, Ramos-Jorge ML. Impact of Early Childhood Caries on the Oral Health-Related Quality of Life of Preschool Children and Their Parents. *Caries Research* 2013;47(3):211-218.
32. Martins MT. Dental caries and social factors: impact on quality of life in Brazilian children. *Braz Oral Res* 2015;29(sup. 1):1-7.
33. Firmino RT, Gomes MC, Clementino MA, Martins CC, Paiva SM, Granville-Garcia AF. Impact of oral health problems on the quality of life of preschool children: a case-control study. *Int J Paediatr Dent* 2016;26(4):242-249.
34. Casamassimo PS, Thikkurissy S, Edelstein BL, Maiorini E. Beyond the dmft: The Human and Economic Cost of Early Childhood Caries. *J Am Dent Assoc* 2009;140(6):650-657.
35. Freire MCM, Reis SCGB, Figueiredo N, Peres KG, Moreira RS, Antunes JLF. Determinantes individuais e contextuais da carie em crianças brasileiras de 12 anos em 2010. *Rev Saude Publica* 2013;47(supl. 3):40-49.
36. Narvai PC, Frazão P, Roncalli AG, Antunes JLF. Cárie dentária no Brasil: declínio, polarização, iniquidade e exclusão social. *Rev Panam Salud Publica* 2006;19(6):385-393.
37. Martins CLC, Jetelina JC. Conhecimento dos pais sobre saúde bucal na infância e a relação com o motivo da consulta odontológica. *J Oral Invest* 2016;5(1):27-33.
38. Oliveira LB, Sheiham A, Bonecker M. Exploring the association of dental caries with social factors and nutritional status in Brazilian preschool children. *Eur J Oral Sci* 2008;116(1):37-43.
39. Abanto J, Paiva SM, Raggio DP, Celiberti P, Aldrigui JM, Bonecker M. The impact of dental caries and trauma in children on family quality of life. *Community Dent Oral Epidemiol* 2012;40:323-331.
40. Bendo CB, Paiva SM, Abreu MH, Figueiredo LD, Vale MP. Impact of traumatic dental injuries among adolescents on family's quality of life: a population-based study. *Int J Paediatr Dent* 2014;24:387-396.
41. Abanto J, Carvalho TS, Mendes FM, Wanderley MT, Bonecker M, Raggio DP. Impact of oral diseases and disorders on oral health-related quality of life of preschool children. *Community Dent Oral Epidemiol* 2011;39(2):105-114.

Article submitted 04/09/2017

Approved 09/04/2018

Final version submitted 11/04/2018

