Assessment of the impact of toothache, untreated caries and its consequences on the quality of life among poor Brazilian children

Avaliação do impacto da dor de dente, da cárie não tratada e suas consequências na qualidade de vida de crianças brasileiras

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Abstract

Purpose: to evaluate the impact of dental pain and the consequences of untreated dental caries on the quality of life in children of low social-economic status aged from 8 to 10 years old. Materials and Methods: in this cross-sectional study, 230 children were submitted to a clinical examination in which the caries-pufa ratio was measured, afterward, they answered to two questionnaires: one about their quality of life (CPQ_{8-10}) and the other about dental pain. Data were statistically analyzed through Chi-square, Mann-Whitney or Kruskal-Wallis tests to evaluate the association between the variables with impact on children's OHRQoL. To establish the existence of risk factors among variables and impact on OHRQoL a Poisson Regression model was applied. Results: dental caries ($p = 0.003$; PR 2.39; 95% CI 1.04–1.56), severity of untreated caries ($p = 0.008$; PR 2.86; 95% CI 1.13–2.00), toothache ($p < 0.001$; PR 2.31; 95% CI 1.64–3.27) and PUFA + pufa index ($p < 0.023$; PR 2.68; 95% CI 1.10–1.87) were associated with and were a predictor factor for impact on overall OHRQoL. All of these variables also had an effect over the social welfare subscale ($p \leq 0.001$), whereas caries presence was also statistically linked with the emotional wellbeing subscale ($p = 0.008$) and dental pain with all four subscales ($p \leq 0.001$). Conclusion: untreated dental caries' clinical consequences and dental pain exerted a negative influence on the quality of life of schoolchildren analyzed.

Keywords: Quality of life. Toothache. Dental caries. Pediatric Dentistry.

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Introduction

It is known that oral disorders may act as limiting factors for the psychological well-being of children, besides implicating on their future development andbehavior[1]. Untreated carious lesions have a close relationship with dental pain and, because of its high prevalence and negative consequences on individuals and communities, represent a public health problem[2-4].

Prevalence of self-reported dental pain of 51.5% was reported in children[5]. Several studies have associated the severity of pain to socioeconomic characteristics, such as low-income, a low level of education of the parents and difficult access to dental services[2,4-7]. This oral disturbance impacts negatively on the quality of life of children, resulting on school absenteeism, difficulty with paying attention in class[2,4], feeding, smiling, speaking and socialization[7].

Especially in poor communities, untreated dental caries in children remains a challenge[8]. Clinical consequences of untreated dental caries, the PUFA + pufa index (Pulpal involvement, Ulceration, Fistula and Abscess), should be monitored to analyze the impact on the quality of life in children and to guide public policies on oral health[9,10]. Furthermore, a healthy mixed dentition is crucial for the proper development of the permanent dentition[5]. Evaluating the individuals' perception about their oral condition and how that affects their quality of life is essential to understand the social impacts of the analyzed disease, it can also be important for the formulation of public health policies that aim for the reduction of health inequalities[11].

Therefore, the purpose of the present study was to assess the consequences of untreated dental caries and prevalence and severity of self-reported dental pain and its association with quality of life among 8- to 10-year-old Brazilian schoolchildren.

Methods

Ethical approval

This study was approved by the Ethics Committee of the Federal University of Alagoas (Protocol No. 2.970.527/18) and conducted in accordance with the Declaration of the World Medical Association of Helsinki. Consent for undertaking the research was obtained from the school principals, and consent to perform the examinations came from the parents or guardians. Only the children of those parents or guardians who returned the signed permission forms were included in the study. The children also authorized their participation in the research through the consent term.

Participants

A cross-sectional study was conducted involving schoolchildren aged 8-10 years in the city of Maceió, which is located in the state of Alagoas in Northeast Brazil. The sample size was calculated using an 18.3% prevalence rate of dental pain from a previous study[12]95% confidence interval, a 5% standard error. The minimum sample size was defined as 227 schoolchildren.

The public school was randomly selected, as were the participants students. The inclusion criteria were children of both genders who agreed to participate in the study. To avoid incorporation of bias, children with a physical or mental disability and any developmental dental anomaly were not included in the analysis.

Oral examination

The examinations were performed by a calibrated examiner for the visual exam following criteria established by the World Health Organization for dental caries[13]. They were performed with natural light using a dental mirror (Golgran®, São Paulo, Brazil) and wooden spatula and conducted by only one dentist who had undergone training and calibration exercises. The Kappa coefficient for intra-examiner agreement was K=0.85. Prevalence of dental caries was scored by using DMFT/dmft index. The decayed (d) component was used as an indicator of untreated carious teeth. The consequences of untreated dental caries were evaluated using the PUFA + index[14].

A combination of the decayed component of DMFT/dmft and PUFA+ pufa index was used in this study to measure the severity of untreated dental caries[14]. The following categories were considered: absence of dental caries experience (DMFT/dmft = 0), untreated carious lesions without clinical consequences (D/d component ≥ 1, PUFA + pufa = 0), and untreated dental caries

with clinical consequences (D/d component ≥ 1, PUFA + pufa ≥ 1). After the clinical examination, the children were invited to respond individually to the questionnaires related to toothache and quality of life through interview.

Quality of life questionnaire (CPQ_{8-10}) and dental pain assessment

The dependent variable in this study was Oral Health-Related Quality of Life (OHRQoL) of children, was assessed using the validated Brazilian version of Child's Perception Questionnaire(CPQ_{8-10})[15], which has 25 items divided into four subscales: oral symptoms (5 items), functional limitations (5 items), and well-being (5 items) and social welfare (10 items). This questionnaire is answerable for the child. The answers are graded on a 5-point Likert scale ("None = 0", "Once or twice = 1", "Sometimes = 2", "Many times = 3" and "Every day or almost every day = 4"), thus the scores for each question were summed, and could range from 0 to 100, with higher scores denoting a greater negative impact on OHRQoL. Reported impact on OHRQoL≥ 1 was considered positive[12]. The presence of toothache was evaluated. The child was asked if she had toothache sometimes in life. The answer was categorized as yes/no.

Data analysis

After data collection and the categorization of variables, it was created a database for statistical analysis using SPSS (Statistical Package for Social Sciences) version 23. The normal distribution of data was verified with the Kolmogorov-Smirnov test. To test the association between two variables, Chi-square, Mann-Whitney or Kruskal-Wallis test was used with post-test by Dunn's nonparametric comparison. To explain the overall impact on the quality of life and its association with the other risk factors the Poisson regression test was applied. The error margin used in the decisions of the statistical tests was of 5%, with the intervals at a 95% confidence level.

Results

Two hundred and thirty children aged between eight and 10 years old took part in the present study. The mean age was 9±0.85 years old, and the male gender accounted for 53.5% of the sample. Only 25.7% of children did not have caries lesions, while 42.6% of them had caries lesions with clinical consequences. Moreover, 80% of the interviewed children said they had experienced dental pain at least once over their lifetime.

Table 1 demonstrates the association between the analyzed variables (age, gender, severity of untreated caries, toothache, PUFA + pufa index and dental caries) and the impact on children's OHRQoL, according to the subscales of the applied questionnaire (CPQ_{8-10}). In this table, it is possible to observe that untreated dental caries with and without clinical consequences were both associated with the emotional well-being ($p = 0.029$) and the social welfare ($p = 0.001$) subscales. Dental pain over their lifetime was reported by the high majority of the interviewed children and was also statistically associated with impair on all subscales (oral symptoms, $p < 0.001$; functional limitations, $p < 0.001$; emotional well-being, $p = 0.001$ and social welfare, $p < 0.001$). Furthermore, the index that expresses untreated caries' clinical consequences (PUFA + pufa index) was associated with the social welfare subscale ($p = 0.001$). 74.3% of the examined children had caries lesions, and its presence was associated with an effect on children's emotional well-being ($p = 0.008$) and social welfare ($p < 0.001$).

The results of the analysis for factors associated with an overall impact on children's OHRQoL are shown in Table 2. All of the evaluated variables (severity of untreated dental caries, $p = 0.008$; PUFA + pufa index, $p = 0.023$; dental pain, $p < 0.001$ and caries presence, $p = 0.003$) were shown to determine negative influence on their quality of life. Nevertheless, it was revealed according to adjusted Poisson Regression (PR), a highly significant association concerning untreated dental caries without clinical consequences (PR 1.95; 95% CI 0.99–1.79), untreated dental caries with clinical consequences (PR 2.86; 95% CI 1.13–2.00), toothache's presence (PR 2.31; 95% CI 1.64–3.27), PUFA + pufa index (PR 2.68; 95% CI 1.10–1.87) and dental caries (PR 2.39; 95% CI 1.04–1.56)with overall effect on OHRQoL.

Table 1 – Variables associated with impact on each Subscales of Oral Health Related Quality of Life in Children

Variables	Impact on OHRQoL (CPQ_{8-10})											
	Subscale 1 (Oral symptoms)			Subscale 2 (Functional limitations)			Subscale 3 (Emotional Well-being)			Subscale 4 (Social welfare)		
	Absence *(n)*	Presence *(n)*	P value*	Absence *(n)*	Presence *(n)*	P value*	Absence *(n)*	Presence *(n)*	P value*	Absence *(n)*	Presence *(n)*	P value*
Age												
8	4	74		16	62		19	59		20	58	
9	5	69	0.302	16	58	0.360	19	55	0.516	20	54	0.168
10	9	69		23	55		25	53		30	48	
Gender												
Male	9	114	0.758	30	93	0.856	37	86	0.327	39	84	0.653
Female	9	98		25	82		26	81		31	76	
Severity of untreated caries												
Without dental caries	8	51		19	40		24	35		29	30	
Untreated dental caries Without clinical consequences	4	69	0.162	14	59	0.198	17	56	0.029	21	52	0.001
Untreated dental caries With clinical consequences	6	92		22	76		22	76		20	78	
Toothache (sometimes in life)												
Absence	13	33	<0.001	23	23	<0.001	22	24	0.001	25	20	<0.001
Presence	5	179		32	152		41	143		44	140	
PUFA + pufa												
Absence	12	119	0.386	33	98	0.601	41	90	0.126	51	80	0.001
Presence	6	93		22	77		22	77		19	80	
Dental caries												
Absence	8	51	0.087	19	40	0.083	24	35	0.008	29	30	<0.001
Presence	10	161		36	135		39	132		41	130	

- Significant association at 5.0%. (*) By chi-square test.

Table 2 – Variables associated with impact on Oral Health Quality of life overall score and Poisson Regression

Variables	Impacton OHRQoL (overall CPQ_{8-10} score)						
	N	Mean – Standard Deviation	P value	P value		Poisson regression PR (95%CI)	P value
Severity of untreated caries							
Without dental caries (a)	59	15.1±14.3		axb	0.023(1)	1	
Untreated dental caries Without clinical consequences (b)	73	20.2±14.9	0.008(1)	axc	0.003(1)	1.95 (0.99-1.79)	0.05
Untreated dental caries With clinical consequences(c)	98	22.8±16.9		bxc	0.409(1)	2.86 (1.13-2.00)	0.004
Toothache (sometimes in life)							
Absence	46	9.96±11.2	<0.001(2)			1	<0.001
Presence	184	22.5±15.8				2.31 (1.64-3.27)	
PUFA + pufa							
Absence	131	17.8±14.7	0.023(2)			1	0.007
Presence	99	22.8±16.9				2.68 (1.10-1.87)	
Dental caries							
Absence	59	15.1± 14.3	0.003(2)			1	0.017
Presence	171	21.7±16.0				2.39 (1.04-1.56)	

-Significant association at 5.0%. (2) By Kruskal-Wallis Test or (1). By Mann-Whitney Test. * The letters a, b and c represent different groups.

Discussion

The present study was conducted to evaluate the impact of untreated dental caries' clinical consequences and dental pain in the oral health-related quality of life of children from 8 to 10 years old. It was here demonstrated and established the relation between dental caries, its clinical consequences and dental pain on children's quality of life. These findings are important to subsidize clinical decision-making, the establishment of health policies, priorities, and organization of patient flow on the public health system.

The prevalence of caries in the present study was of 74.3%, very similar to a previous value found in a study conducted in children with similar social-economic characteristics, as well-established dental decay is a multifactorial disease, low social-economic conditions are highly associated with poorer oral conditions and higher prevalence of carious lesions[16]. Studies with children in the same age group reveal this prevalence to be ranged from 52.3 to 64.6%[17-20], considerably lower than the results herein. The participants of this study are in a social vulnerability condition, characterized by inapt habitation situation, lack of basic sanitation and low income. Their parents low level of education affects their salary, diminishing their access to preventive means, professional or home used. It is also a predictor to health literacy, habits, diet or patterns of health services utilization and access[21]. A poor nutrition diet, less frequent meals and low access to healthy food are dietary factors associated with low-income families and are also a clear pathway fororal diseases progress, contributing to the maintenance of oral health inequalities[22].

Previous studies have stated that caries'prevalence in children in high-income countries is 49%, whereas in low-income this number reaches 64%[23]. Either way, the number found by this study is higher than both of them. Studies conducted on poorer populations find a higher prevalence once the caries disease is greatly associated with social-economic conditions. Even so, this number highlights the deprived health situation that these children are exposed to, showing the urgent need of public policies that aim to diminish social and health inequalities that make these poor children carry the burden of caries' disease[21,22].

A statistical association between gender or age and OHRQoL's subscales was not found in

this study. This has also been stated in other researches[2,20]. The influence of gender on self-perception quality of life seems to increase with age, as in older children the female gender is more sensitive to how people perceive their appearance when in comparison to the opposite gender[24]. Quality of life's self-perception seems to reach lower scores with increasing age. The difference of two years between the children here examined and interviewed may not be enough to establish a statistical parallel, whereas they still belong to the same age group[24].

Results herein demonstrate that both the presence of dental caries and its severity had significant association with impact in children's OHRQoL, furthermore children with dental caries clinical consequences had a 2.86 higher chance of presenting impact over their overallOHRQoL, while the presence of dental caries meant that children were 2.39 more likely to have an impact on their quality of life. This is a common finding in other studies[16,18-20], once the presence of untreated dental cariesmay produce disturbances and limit daily activities such as eatingand sleeping, essential to children's health and development[20].

However, dental caries and its severity are vastly associated with all domains of OHRQoL, with the oral symptoms and functional limitations subscales reaching higher mean scores[18,19]. Within this study, although it was shown an impact on overall OHRQoL, the presence of dental caries and its severity were only statistically associated with the emotional wellbeing and social welfare subscales. The low social-economic status of children examined by this research can define a worse understanding of the questions asked[25]. Nevertheless, children start to acquire and mature the capacity to evaluate their sentiments and behavior amid the eighth and tenth years of their lives, it is also on this phase that they begin to give importance to how others perceive their appearances, poorer children carry the burden of this disease and are, therefore, a portrait of oral health inequalities[21,26]. The higher caries' prevalence is mainly set by their social-economic characteristics; the biological ones are not as determinant[21].

The presence of a PUFA + pufa index score equal or higher than 1, which measures the clinical consequences of caries, was statistically associated with an impact in overall OHRQoL and its social welfare subscale, additionally, children with PUFA + pufa> 1 were also 2.68 times more likely to present a negative impact on their OHRQoL. This may be justified once PUFA + pufa index is usually associated with the presence of pain, when existent pain has a negative impact on the emotional and social wellbeing of children[5]. Schoolchildren are in a constant process of maturing their understanding of emotions and social treats. Dental pain and decay were also demonstrated to cause impairment in children's overall daily activities, including their social relations. Withal, the restrictions over oral health services' access managed by the social-economic conditions of the studied population contribute to the progression of caries, setting an almost clear path for its consequences[2,5,27].

Untreated dental caries and its clinical consequences are extremely connected with dental pain, which is a public health problem[28]. 80% (n = 184) of the interviewed children had experienced dental pain in their life, which is higher than the rate found in other studies of 35.7%[4] and 51.5%[5]. Dental pain was statistically associated with impact on overall and all subscales of OHRQoL and also a predictor for impact on their quality of life. Children that had experienced dental pain at least once over their lifetime were 2.31 more likely to report impact on their OHRQoL. This correlation is commonly found in literature[4,5,20]whereas this symptom establishes multiple limitations and impairment on children's usual activities, prejudicing their learning process and development of normal functions, determining lifelong damages to their life, once it occurs on an important period of intellectual and emotional growth, possibly undermining their full cognitive maturity[20,29].

This study presents limitations intrinsic to a cross-sectional delineation, being incapable of establishing cause-effect correspondences. Furthermore, it was conducted with children of low social-economic status, these children could have a worse understanding of the

questions asked. However, the present paper is representative of its population and offers original and important evidence on the impact of dental caries' clinical consequences and pain on OHRQoL of schoolchildren between 8 to 10 years old. It is essential to considerate that children's evaluation of oral health is greatly impacted by multiple factors, including their social economics conditions and psychological stability. Longitudinal studies are necessary to determine the long-term effects of caries' clinical consequences and dental pain on children's quality of life.

Conclusion

Researches on children's self-perception of OHRQoL may provide guidance for treatment goals and outcomes and the formulation of public health policies. For the schoolchildren surveyed, untreated dental caries clinical consequences and dental pain exerted a negative influence on OHRQoL, regardless of gender and age. The findings also suggest that children with dental caries clinical consequences and dental pain are also at a greater risk of having deleterious influences on their quality of life.

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Resumo

Objetivo: avaliar o impacto da dor de dente e das consequências da cárie não tratada na qualidade de vida de crianças entre 8 e 10 anos com baixos indicadores socioeconômicos. Métodos: neste estudo transversal, 230 crianças escolares foram submetidas a um exame clínico, no qual foram avaliados seus CPO/ceo (Dentes cariados, perdidos e obturados) e PUFA/pufa (Envolvimento pulpar, ulceração, fístula e abscesso). Em um segundo momento, elas responderam a dois questionários: um sobre a qualidade de vida (CPQ_{8-10}) e outro sobre odontalgia. Os dados foram analisados estatisticamente por meio dos testes de Chi-quadrado, Mann-Whitney ou Kruskal-Wallis, para avaliar a associação entre as variáveis e o impacto na qualidade de vida relacionada à saúde oral (QdVRSO) da criança. Para estabelecer a existência de fatores de risco para impacto na QdVRSO entre as variáveis, um modelo de regressão de Poisson foi aplicado. Resultados: a presença de cárie (p = 0,003; RP 2,39; 95% IC 1,04-1,56), a severidade da cárie não tratada (p = 0,008; RP 2,86; 95% IC 1,13-2,00), dor de dente (p < 0,001; RP 2,31; 95% IC 1,64-3,27) e PUFA/pufa (p < 0,023; RP 2,68; 95% IC 1,10-1,87) foram associados com impacto na QdVRSO, assim como também foram fatores preditores para o impacto na qualidade de vida relacionada à saúde oral. Todas as então citadas variáveis também exerceram efeito sobre a subescala do bem-estar social (p ≤ 0,001), enquanto a presença de cárie esteve estatisticamente conectada com a subescala do bem-estar emocional (p = 0,008) e a dor dentária com todas as subescalas da QdVRSO (p ≤ 0,001). Conclusão: as consequências clínicas da cárie não tratada e a dor dentária exercem uma influência negativa na qualidade de vida das crianças analisadas.

Palavras-chave: Qualidade de vida. Odontalgia. Cárie dentária. Odontopediatria.

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