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Impact of Oral Health on the Quality of Life of Preschoolers and Their Families

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Abstract

The aim of this study was to evaluate how the oral hygiene condition can influence the Oral Health-Related Quality of Life (OHRQoL) of preschoolers and their families. A cross-sectional study was conducted involving 446 children aged 2 to 6 years from public schools located in Rio de Janeiro, Brazil. The groups were dichotomized: regular/poor oral hygiene condition (RPOH) or good oral hygiene condition (GOH). The caregivers answered the Brazilian version of the Early Childhood Oral Health Impact Scale (B-ECOHIS). The average score in the RPOH group was 6.36 (6.35 DP) and GOH was 4.43 (5.35 SD) ($P < .01$). In the child subscale, the average of the RPOH and GOH group were, respectively, 4.12 (4.14 DP) and 3.13 (3.66 DP) ($P = .01$). In the family subscale, RPOH and GOH group were, respectively, 2.24 (3.12 DP) and 1.29 (2.52 DP) ($P = .01$). RPOH group had the greatest impact on OHRQoL.

Keywords

quality of life, oral health, dental plaque, tooth deciduous, dental deposits

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Introduction

Despite the great achievements associated with oral health in recent decades, dental caries and periodontal disease are still frequent conditions. Poor oral hygiene results in dental biofilm accumulation, which is the triggering factor for the development of both diseases.[1]

The etiology of periodontal disorders is complex and dynamic, through the interaction between the microorganism and the host response, often modified by behavioral factors.[2] Similarly, periodontal disease in children may influence physical and psychosocial factors.[3] In addition, periodontal inflammation may negatively affect systemic condition through available evidence that highlights the importance of monitoring and preventing this disease in children and adolescents.[2] Consequently, brushing stands out as the most efficient way to modify the patient's behavior and lead him to exercise satisfactory control of the dental biofilm. In early childhood, parents should be involved in brushing and flossing, and this should continue until children develop the necessary ability.[4]

The World Health Organization defines health as "a complete state of physical, mental, and social well-being."[5] Thus, oral health is part of this concept, however the issue of psychosocial involvement inherent in this concept is only detected with use of sociodental questionnaires, which are the instruments of quality of life in oral health (OHRQoL). The questionnaires adopted to assess OHRQoL aim to capture the consequences of oral disorders in the routine of adults, children and family members.[6] Although there are many instruments available for evaluation, for the preschool age group there are only the Brazilian versions of the "Early Childhood Oral Health Impact Scale" (ECOHIS)[7] and "Oral Health Outcomes for 5-year-old children" (SOHO-5)[8] which have been widely used due to reliable psychometric properties.

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Dental caries has been associated with a negative impact on the OHRQoL of children, through functional limitations and impairment to social relationships.[9] Some studies have analyzed the biofilm index in other age groups.[10,11] However, there are few studies that correlate the presence of biofilm in the 2- to 6-year age group[12,13] and, regarding OHRQoL, the biofilm has only been evaluated in older age groups.[3] Thus, this study aimed to evaluate how the oral hygiene condition can affect the OHRQoL of preschoolers and their families.

Materials and Methods

Ethical Aspects

This research was approved by the Human Research Ethics Committee, Fluminense Federal University (02542412.0.0000.5243—protocol: 68539) and was conducted in accordance with the Declaration of Helsinki and the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE).[14]

Study Design and Sample

This cross-sectional study consisted of children from 2- to 6-year-old years, attending public preschools in the city of Nova Friburgo, located 136 km from Rio de Janeiro, Brazil. The city of Nova Friburgo has 190 631 inhabitants and covers an area of 93 414 km² divided into 8 districts. Its population is predominantly urban (87%).[15]

For the sample calculation of this study we used the public domain program OpenEpi, version 3.01.[16] The sampling basis was the oral hygiene condition evaluated by the Simplified Oral Hygiene Index in children aged 2 to 6 years[17] (42.4%), with 5% error and 95% confidence interval. In order to compensate a possible cluster effect, the sample was increased by 10% (design effect = 1.0), thus totaling 376 preschoolers. Ten percent more patients were added to compensate for any loss. Thus, the sample reached a minimum of 413 subjects. Children were randomly selected and grouped according to their age and the location of their preschools (18 in urban areas and 9 in rural areas) to ensure representativeness relative to the original population base.

Subjects were invited to participate in the study according to the following inclusion criteria: children aged 2 to 6 years with complete deciduous dentition of both genders; parents/caregivers who signed the informed consent form and returned the HRQoL questionnaire. Exclusion criteria were: preschoolers using prostheses or history of orthodontic treatment; children with special needs (motor, mental, or some kind of syndrome) and systemic diseases that could be confounding factors for the evaluation of HRQoL. In addition, children who did not allow oral examinations to be performed for behavioral reasons were excluded.

Non Clinical Data Collection

Sample characterization. A questionnaire containing questions about socio-demographic characteristics was sent to the parents/caregivers of each selected child. The questionnaire had the following information about sample characteristics: (i) child: gender, age, ethnicity; (ii) parents/caregivers: age, ethnicity, and level of education (years of schooling); and (iii) area of residence of the child (urban or rural).

OHRQoL assessment using the socio-dental indicator. All parents/caregivers were asked to self-complete the socio-dental indicator used in this study, the Early Childhood Oral Health Impact Scale (ECOHIS), initially developed by Pahel et al[18] and later validated in the Brazilian study by Martins-Junior et al.[19] The subscales on the Child Impact section are symptoms (1 item), function (4 items), psychology (2 items), and self-image/social interaction (2 items). The subscales on the Family Impact section are parental distress (2 items) and family function (2 items). Each item has 6 response options: 0 = never; 1 = hardly ever; 2 = sometimes; 3 = often; 4 = very often; and 5 = "I don't know." Total ECOHIS scores and scores for individual domains were calculated as a simple sum of the response codes. This instrument ranges from 0 to 52. A higher ECOHIS score indicates greater impact and/or greater problem, that is, a poorer HRQoL.

Initially, a pretest study was conducted on the same population at 2 times (initial and 2 weeks later) to assess the understanding of the instrument. For this, a pilot study with 41 parents/caregivers (10% of a minimum sample reached and not part of the study population) was recruited from local preschools.

Clinical Data Collection

Oral condition assessment using clinical indicators. The oral examination of the children was performed according to the World Health Organization (WHO).[20] The child and the examiner should be seated in a chair. The procedures were done at school using materials such as: spatula, gauze, gloves, and natural lighting.

The child's oral examination was performed by 2 previously calibrated examiners (LAA and LSA). The training exercise to evaluate dental caries experience and the presence of biofilm was performed using images

of different clinical situations and calibration was performed with the pilot study sample on 2 different occasions, with a two-week interval between sessions. Kappa coefficient of agreement was used to evaluate realiability. Inter-examiner reliability for dental caries experience ranged from 0.90 (95% CI 0.71-0.95) to 1.00, and intra-examiner reliability was Kappa = 1.00. The inter-examiner reliability for the presence of dental biofilm was 1.00 (95% CI 0.71-0.95) and the intra-examiner reliability was Kappa = 1.00.

To assess the experience of dental caries, the diagnosis of decayed teeth, indicated decayed, missing and filled index (DMFT) followed the established by the WHO.[20] The DMTF of children was categorized according to severity: caries free = 0; low severity = 1-5; or high severity ≥ 6.

To evaluate dental biofilm, the Simplified Oral Hygiene Index (OHI-S)[21] was used. The Simplified Oral Hygiene Index is the combination of plaque and dental calculus. As the study population consisted of children in the primary dentition, the facial and lingual tooth surfaces were examined on the following teeth 51, 55, 65, 71, 75, and 85. The corresponding value was noted and divided by the number of surfaces examined to generate the tooth IHOS. Oral Hygiene was classified as good, fair or poor, according to the respective values 0.0 to 1.2, 1.3 to 3.0, and >3.0. These data were categorized as good oral hygiene (GOH) and regular/poor oral hygiene (RPOH).

Statistical Analysis

Data were analyzed through the Statistical Package for the Social Science program (SPSS® for Windows; version 16.0; Chicago, IL, USA). The level of statistical significance was $P < .05$. The psychometric properties of the dental socio-dental indicator were evaluated since it was designed to be used in the age group of 2 to 5 years and, in this study, we extended the age group of 6 years. They were evaluated by internal consistency and test-retest reliability. The reliability of the internal consistency was assessed by Cronbach's alpha and the test-retest reliability by the interclass correlation coefficient (ICC).

The averages were obtained for age and frequency for the child's age (24-36 months/37-60 months), gender and ethnicity, years of study of parents/caregivers, and house location (rural or urban). The relationship of clinical indicators as well as dental caries experience with oral health condition (GOH /RPOH) and socio-demographic variables were assessed using Chi-Squared Test and Fisher's Exact Test and Odds Ratio.

For the initial exploratory analysis, the frequency distribution was determined for the individual socio-dental indicators (ECOHIS). The association of these items with the clinical indicator was then obtained through the Chi-Square Test.

ECOHIS index scores were calculated using the additive method by summing the numeric response codes for each item. The average and median comparisons were made for items in global scores and subscales. The Kolmogorov-Smirnov Test was used to verify the normal distribution of values. Since the items were recorded with the ordinal scale, parametric statistical procedures (One-way ANOVA) were used.

Results

From the 606 patients evaluated, 446 were included in the study. The main reason for the exclusion was the quality of completing the OHRQoL questionnaire. Thus, the final sample consisted of 446 children and their representatives (74% positive response rate). The psychometric properties of the socio-dental indicator (ECOHIS) in this sample were evaluated and presented a satisfactory reliability of 0.80 for Cronbach's alpha and 0.94 for test-retest. The characteristics of the sample were presented in Table 1. The presence of biofilm was 59.9%. Regarding the average age of the children, 46.4% in the RPOH group were 24 to 36 months and 53.6% were 37 to 60 months old. For the GOH group, 49.2% were between 24 and 36 months and 50.8% between 37 and 60 months. Regarding gender, 49.8% were girls and 50.2% boys. According to the variables analyzed, there was a statistically difference when the association between GOH and RPOH was performed between the parents' years of study and ethnicity ($P < .01$) and ($P = .01$), respectively. Children in the RPOH group were twice as likely to have dental caries ($P < .001$, OR 2.32; 1.51-3.55). The mean total score in the RPOH group was 6.36 (6.34 DP) and GOH of 4.43 (5.35 SD) ($P < .01$). In the child subscale, the means of the RPOH and GOH group were, respectively, 4.12 (4.14 DP) and 3.13 (3.66 DP) ($P = .01$). In the family subscale, the means in the RPOH and GOH group were, respectively, 2.24 (3.12 DP) and 1.29 (2.52 DP) ($P < .01$). The psychological ($P = .43$) and image/social interaction ($P = .37$) domains showed no difference between groups (Table 2).

Discussion

Oral health in children is mostly focused on preventing and treating dental caries. However, it is important to

Table 1. Sample Characterization and Association Between Regular/Poor × Good Oral Hygiene Condition with Exploratory Variables.

Parents/caregivers	RPOH (n = 267/59.9%)	GOH (n = 179/40.1%)	Odds ratio (95% CI)	*P* value
Years of study** (%)				
≤8	109 (40.8%)	108 (60.3%)	0.46 (0.30-0.69)	<.01
≥9	143 (53.6%)	65 (36.3%)		
Preschoolers	**RPOH (n = 267/59.9%)**	**GOH (n = 179/40.1%)**	**Odds ratio (95% CI)**	***P* value**
Average age* (SD)	3.65 (1.33)	3.39 (1.50)		.06
Age group** (%)				
24-36 months	124 (46.4%)	88 (49.2%)	0.90 (0.60-1.33)	.57
37-60 months	143 (53.6%)	91 (50.8%)		
Gender*** (%)				
Female	130 (48.7%)	92 (51.4%)	0.90 (0.60-1.33)	.62
Male	137 (51.3%)	87 (48.6%)		
Race*** (%)				
Caucasian	172 (64.4%)	141 (78.8%)	0.49 (0.31-0.77)	.01
Black	95 (35.6%)	38 (21.2%)		
House location*** (%)				
Rural	89 (33.3%)	50 (27.9%)	1.29 (0.84-1.99)	.25
Urban	178 (66.7%)	129 (72.1%)		
Search for treatment*** (%)				
No	171 (64.0%)	118 (65.9%)	0.92 (0.61-1.40)	.76
Yes	96 (36.0%)	61 (34.1%)		
Dental carie experience***				
No	158 (53.4%)	138 (46.6%)	2.32 (1.51-3.55)	<.001
Yes	109 (72.7)	41 (27.3%)		

Abbreviations: CI: confidence interval; RPOH: regular/poor oral hygiene; GOH: good oral hygiene.
*Student *T* test; **Chi-square test; ***Fisher exact test; statistical significance (*P* < .05).

Table 2. Association Between Clinical Indicators and Socio Dental Indicator.

	Clinical indicator		
Social dental indicator	RPOH	GOH	
Scale/subscale/domain (deviation)	Average (SD)	Average (SD)	*P* value
Total score (0-52)	6.36 (6.34)	4.43 (5.35)	<.01
Child subscale (0-36)	4.12 (4.14)	3.13 (3.66)	.01
Symptoms domain (0-4)	0.57 (0.94)	0.28 (0.65)	<.01
Function domain (0-16)	2.05 (2.22)	1.55 (1.93)	.01
Psychological domain (0-8)	1.21 (1.61)	1.08 (1.67)	.43
Self-image/social interaction domain (0-8)	0.29 (0.84)	0.22 (0.89)	.37
Family subscale (0-16)	2.24 (3.12)	1.29 (2.52)	<.01
Parental distress domain (0-8)	1.18 (1.85)	0.57 (1.34)	<.01
Family function domain (0-8)	1.05 (1.66)	0.72 (1.51)	.03

Student *T* test; statistical significance (*P* < .05).

understand the reasons for long-term maintenance of oral and periodontal tissues in adulthood.[22] According to the American Academy of Pediatric Dentistry, children and adolescents require periodontal condition registration as part of routine dental appointments. Biofilm should be evidenced, thus allowing the identification of sites that may contribute to gingivitis and/or dental caries. In addition, oral hygiene recommendations should be made to patients and parents to elucidate the importance of their removal.[4]

When gingivitis develops due to biofilm accumulation, gingival bleeding may occur in daily routine activities, such as during tooth brushing, which has a negative impact on other areas of the patient's life.[6] As dental caries develops, its consequences such as the initial experience of pain and difficulty chewing may affect the child's immediate and long-term quality of life.[23]

In the present study, a higher prevalence of regular/poor oral hygiene (RPOH) was observed in the children analyzed. Thus, children with higher visible biofilm accumulation were twice as likely to develop dental caries. These results are consistent with previous studies[24] and others that have also investigated the relationship between tooth brushing frequency and dental carie.[9] Early inclusion of children in biofilm prevention and control programs may prevent future disease development and motivation is a fundamental factor for its reduction.[1]

The OHRQoL can be influenced by a number of characteristics. Some studies showed a negative impact on the OHRQoL of children when associated with the most varied clinical conditions of oral health.[25,26] In the present study, although the averages were low, when comparing the two groups (GOH and RPOH), the RPOH group had the greatest impact on OHRQoL.

The esthetics appearance seems to be more valued in young patients than in older.[27] However, in this research, the psychological issue and the image/social interaction did not differ. These results may be related to the fact that smile/esthetics in the deciduous dentition is not such an important factor because of the child's psychological immaturity. However, some studies had showed a negative influence on these aspects when there was a comparison of oral conditions such as dental caries and gingivitis due to biofilm accumulation.[28,29]

The clinical, socioeconomic aspects and factors of the domestic environment also impact the students OHRQOL, demonstrating the importance of addressing these factors when planning oral health promotion interventions.[30] Children living in families with higher incomes usually have better oral hygiene behaviors, access to health care, preventive interventions, which can positively influence their quality of life.[31] In the present study, there was a significant difference for the years of study of the parents/caregives, according to previous results,[32] which confirm that oral prevention does not receive due attention in children whose family members have lower socioeconomic levels. In addition, it was observed an impact on quality of life in the family subscale, however, the caregivers did not search for adequate care. This fact may be related to family structure, which may directly affect the demand for oral health care.[33]

Quality of life assessment has become an integral part of health programs. In recent years, important instruments have been used to validate OHRQoL in children.[6] The Brazilian version of the Early Childhood Oral Health Impact Scale (ECOHIS) questionnaire was used in this study to assess the impact of oral health problems on the quality of life of 2- to 6-year-old children and their families, as it presents reliability and interpretability, as confirmed by previous studies.[7,19]

This paper highlights the importance of having periodic preventive oral health education at all levels, that is, at home, in schools and communities to better encourage children and their caregivers to maintain oral hygiene. It also allows dentists to guide them in implementing these measures on a daily basis, as oral diseases such as gingivitis and dental caries are recurrent problems. However, there is a limitation that it includes only children from public schools, which may restrict access to health services. Thus, future researches needs to observe and compare OHRQoL in populations with other social and economic conditions.

Conclusion

The presence of biofilm in children aged 2 to 6 years was high, however, when comparing RPOH and GOH groups, although the averages were low, the RPOH group had the greatest impact on OHRQoL. Regarding the development of dental caries, children with regular/poor oral hygiene were twice as likely to experience this disease.

Author Contributions

All authors contributed to the achievement of the research and read and approved the final version of the manuscript. LAAA and LSA made the design of the work and the final draft of the manuscript. LAAA and MGLA collected the data. MGLA, LAAA, and LSA realized the data management. MGLA, LAAA, and FG wrote the paper. LAAA, LSA, and FG reviewed critically the final draft of the paper.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Ethics Approval

This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Ethics

Committee of Fluminense Federal University (02542412 .0.0000.5243 - protocol: 68539).

Consent to Participate/to Publish

A signed, written informed consent form was obtained from the parents for the research and further publication of the case.

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