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PREVALENCE OF DENTAL CARIES AND FLUOROSIS IN CHILDREN TREATED AT A DENTAL SCHOOL CLINIC IN THE NORTH OF MINAS GERAIS: A PILOT STUDY

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ABSTRACT
The objective of this study was to evaluate the prevalence of dental caries and fluorosis in children attended at the School Clinic of Faculdade Funorte de Janaúba-MG and to verify the influence of socioeconomic variables. This is a cross-sectional descriptive observational study carried out with children attended at the Funorte School Clinic between January 2021 and December 2022. The convenience sample of the pilot study was composed of patients selected from the disciplines of Pediatric Dentistry I and II and Integrated Clinic of Childhood and Adolescence. Clinical examinations were carried out on the children and a socioeconomic questionnaire was applied to the guardians. The DMFT index was used for the evaluation of dental caries, and for fluorosis the Dean index. Data were analyzed descriptively using SPSS software, version 26.0 ($p< 0.05$). The sample consisted of 9 participants invited to the study. The mean age was 11.0 ± 1.50 years. The prevalence of caries was 88.88%, with a mean DMFT index of 3.67 ± 2.34. The prevalence of fluorosis was 44.44%, with a Community Fluorosis index of 1.16, with grades ranging from very mild to moderate. Children from families with lower income had a higher prevalence of caries. A high prevalence of dental caries and fluorosis was evidenced in children attended at the School Clinic of Faculdade Funorte de Janaúba-MG, associated with socioeconomic factors.

Keywords: Dental caries, Dental fluorosis, Socioeconomic factors, Epidemiology, Child.

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INTRODUCTION

The oral cavity, rich in microorganisms such as bacteria and fungi, is the area with the greatest variability of microorganisms in the human body. The cavity contains several structures, each one being a niche conducive to microbial development, being exposed to physical, chemical and biological elements that can compromise homeostasis, in balance, these microorganisms favor oral health. (SILVA, 2016).

Caries is a multifactorial disease caused by a high-carbohydrate diet, poor oral hygiene, quality and quantity of salivary flow, and external determinants such as poor socioeconomic conditions. It affects the tooth in a chronic and aggressive way, and can lead to its partial or total loss. Its main etiological factor is the colonization of microorganisms, such as *Streptococcus mutans*, which produce acids by fermenting carbohydrates, demineralizing mineralized tissues (PITTS et al., 2017). In addition, caries is a persistent public health problem, because even knowing its etiological factors, it still has a high prevalence worldwide (MAGALHÃES et al., 2021).

The caries disease affects the economically vulnerable population unequally. The difficulty in accessing dental treatments, and the low level of knowledge about oral health compete with an inadequate diet and oral hygiene, which culminate in the appearance of dental caries (QUEIROZ *et al*., 2018). Thus, knowledge of the epidemiology of caries disease, especially in focus and vulnerable groups, is essential for the recognition of its etiology and for the implementation of preventive and restorative strategies for its control (JENSEN; SCALLOP; SCUTTI, 2017).

Fluoride is crucial for the control of tooth decay, as it interferes with the demineralization and remineralization of the teeth. However, excessive ingestion during the period of tooth formation can cause dental fluorosis that manifests itself as stains or stretch marks on the enamel of the teeth (YEVENES, 2019; ARSATI, 2018). Fluoridation of public water prevents caries, but must be carefully controlled to avoid fluorosis, as confirmed in the literature (SANTOS; KLAUBERG, 2022). The relationship between caries and dental fluorosis is notorious due to the dual effect of fluoride, which can reduce caries and increase fluorosis, if in excess and at certain periods. It is essential to implement safe fluoride supplementation measures and to promote fluorosis awareness actions for prevention, both for the population and for the responsible agencies (COSTA; GOOD; PORTO, 2021).

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Epidemiological surveys in School Clinics are essential for the identification of the most prevalent oral diseases in the population served. These data are fundamental for the development of public policies and interventions in oral health. The objective of this study was to evaluate the prevalence of dental caries and fluorosis in children treated at the Funorte Janaúba School Clinic and to verify the influence of socioeconomic variables.

METHODS

This is a cross-sectional descriptive observational study carried out with children of both sexes attended at the School Clinic of the United Colleges of Northern Minas (FUNORTE), on the campus of Janaúba-MG. The convenience sample was selected from among patients treated between January 2021 and December 2022 in the disciplines of Pediatric Dentistry I and II and Integrated Clinic for Childhood and Adolescence.

The research was approved by the Research Ethics Committee (CEP) of FUNORTE, under opinion number 6,264,978. In addition, the prior consent of the participants' guardians was obtained by signing the Informed Consent Form (ICF) and the children's agreement was obtained by signing the Informed Consent Form (TALE), in accordance with Resolution 466/12.

Ten medical records of patients treated at FUNORTE Janaúba's children's care clinics were chosen, selected through a non-probabilistic and non-random convenience method during the period from January 2021 to December 2022. The researchers contacted the children's guardians through the telephone numbers provided in the records, explained the objectives of the research and invited the minors to participate. Evaluation times were scheduled one week in advance for participants who agreed to collaborate.

The research team consisted of two dentists, previously trained and calibrated, aiming at uniformity in the application of instruments and diagnostic criteria. Of the ten scheduled participants, only nine showed up to participate in the research. Before the oral examination of the children, the authorization of the guardians and the children was requested, who signed the ICF and the TALE, respectively, in a reserved room. Then, the parents and guardians were invited to fill out a socioeconomic questionnaire. The survey included information on the child's ethnicity, number of family members, monthly family income, employment status of the father and mother, and the level of education of both parents.

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Subsequently, the participants were referred to the FUNORTE dental clinic, where the children's oral examination was performed. Before performing the exams, prophylaxis was performed on all participants, to remove bacterial plaque and better visualize the dental structures, ensuring greater accuracy in the diagnosis of oral conditions. The examinations were conducted in a dental chair equipped with a reflector and a disposable wooden tongue depressor. Oral health conditions were evaluated using the dmft index for dental caries in mixed dentition. In addition, dental fluorosis was assessed using the Dean Index, which has been used for many years to describe fluorosis, which allows comparison with a larger volume of studies. It is the index recommended by the WHO for studies of dental fluorosis in populations (WHO, 1997). In addition, given the high subjectivity involved in the measurement of this condition, it is the epidemiological instrument of choice for population surveys, with a view to obtaining better levels of reproducibility in relation to other indices (SB BRASIL, 2012). The index classifies fluorosis into five grades: normal, questionable, very mild, mild, moderate or severe. The Community Fluorosis Index (ICF) was also used, assigning points to each category of the Dean index (WHO, 1997).

Data were collected from the socioeconomic form and the results of the clinical oral examination. This information was then entered into the IBM Statistical Package for the Social Sciences (SPSS) software, version 26.0 (SPSS Inc., Chicago, USA), which was used to conduct descriptive analyses and association tests ($p < 0.05$).

RESULTS

10 children were invited to participate in the study, but 1 of the participants did not show up on the scheduled day, resulting in a total sample of 9 (100%) participants. Among these, 6 (66.66%) were female, aged between 9 and 13 years (mean 11.0 ± 1.50 years). Regarding ethnicity/race, most children were declared as brown by their guardians, representing 6 (66.66%) participants. Regarding the presence of some type of disability in the children, 8 (88.88%) reported not having any disability, while 1 (11.11%) stated having a physical/motor disability.

Regarding the origin of the participants' homes, 7 (77.77%) reported living in the urban area. Regarding the number of family members, 6 (66.66%) participants reported having between 4 and 6 people in the family group. Regarding the monthly family income, 3 (33.33%) reported that it varied from half to 1 minimum wage. Regarding the employment status of the participants' fathers, 6 (66.66%) stated that the father works regularly.

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Regarding the employment status of the participants' mothers, 6 (66.66%) indicated that the mother works regularly. Regarding the level of education of the participants' parents, 5 (55.55%) reported that the father had completed high school and regarding the level of education of the participants' mothers, 3 (33.33%) indicated that the mother had completed high school.

Table 1: Descriptive data of the sample.

	Frequency	Percentage	Total
Gender			9
Male	3	33,33%	
Female	6	66,66%	
Ethnicity			
White	2	22,22%	
Black	1	11,11%	
Brown	6	66,66%	
Has some type of disability			
No	8	88,88%	
Motor/physical disability	1	11,11%	
Place of residence			
Urban area	2	22,22%	
Rural area	7	77,77%	
Number of family members			
From one to three people	3	33,33%	
Four to six people	6	66,66%	
Monthly family income			
From half to one minimum wage	3	33,33%	
From one to one and a half minimum wages	1	11,11%	
From one and a half to two and a half minimum wages	2	22,22%	
From two and a half to three minimum wages	2	22,22%	
Above three minimum wages	1	11,11%	
Father's situation in relation to work			
Works regularly	6	66,66%	
Unemployed	2	22,22%	
He is deceased and left no pension	1	11,11%	
Mother's situation in relation to work			
Works regularly	6	66,66%	
Unemployed	2	22,22%	
Another situation	1	11,11%	
Father's education level			

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Complete elementary school	1	11,11%	9
Incomplete high school	2	22,22%	
Complete high school	5	66,66%	
No Response	1	11,11%	
Mother's level of education			
Incomplete elementary school	1	11,11%	
Incomplete high school	1	11,11%	
Complete high school	3	33,33%	
Incomplete Superior	2	22,22%	
Complete Superior	1	11,11%	
No Response	1	11,11%	

Source: Authors.

Regarding the DMFT index, which assessed dental caries in the sample, 2 (22.22%) participants had an index of 5. Regarding the Dean index, 3 (33.3%) participants had a questionable degree of fluorosis. The community DMFT index of the sample was 3.67 ± 2.34 and the community fluorosis index was 1.16. The prevalence of caries disease experience was 88.88% and the prevalence of fluorosis experience was 44.44%.

Table 2: Sample distribution according to individual variables.

Variable		n	%
Caries Experience			
	DMFT = 0 (caries-free and no fillings)	1	11,1
	DMFT < 3 = (better than normal for age)	2	22,2
	DMFT = 3 (normal for age)	1	11,1
	DMFT > 3 (worse than normal for age)	5	55,5
Fluorosis Experience			
	Normal	2	22,2
	Questionable	3	33,3
	Very light	1	11,1
	Lightweight	1	11,1
	Moderate	2	22,2

Source: Authors.

DISCUSSION

The results of this study highlight the high prevalence of tooth decay among participants, along with an intermediate degree of dental fluorosis. These findings suggest a predominantly technicist approach to intervention, rather than a prevention-oriented approach.

The mean DMFT observed in the sample of this study was 3.67, considerably exceeding the national average of 1.6, as reported in the preliminary results of SB Brasil, 2022, and also above the state average of 1.8 and the northern interior of the state, which

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was 2.4, as reported by SB Minas Gerais in 2012 (Pinto *et al.*, 2018). This marked difference can be explained by the fact that the sample was composed of patients from a teaching clinic, who often arrive with already established dental demands. This reflects the predominant curative character in Brazilian culture, similar to what Almeida et al. (2019) observed in their study in school clinic of the Federal University of Campina Grande (UFCG) with the analysis of 195 medical records of children aged 2 to 12 years treated at the institution, in which 74.4% of the patients sought dental treatment with the aim of solving an already established problem. This aspect may, in part, justify the disparity in relation to the state and national averages. However, it is important to note that the average is closer to that observed in studies carried out in school clinics. In the work of Palhares et al. (2024), who analyzed 169 medical records of children aged 6 to 12 years treated at the children's clinic II at UFCG, where an average DMFT of 4.53 was recorded.

The prevalence of dental caries in the sample of this study was 88.88%, while dental fluorosis was observed in 44.44% of the participants. These data are close to the findings of Pereira et al. (2021), which recorded a prevalence of dental caries of 72% in children aged 8 to 10 years treated at the children's dental clinic of a private university in Teresina-Piauí. But those found in the work of Marques, Boas and Tognetti (2021), who evaluated 51 children aged between 4 and 12 years old attended at the children's clinic of the dentistry course at the University of São Francisco in Bragança Paulista-São Paulo, where they investigated Enamel Developmental Defects (DDE), including dental fluorosis with a prevalence of 0.00% in both deciduous and permanent dentition, a fact that the authors justify due to the low age range of the sample, although it does not present the mean age of the sample. However, these values are higher than those found in schoolchildren, as in the study of (Paxoto; Casotti; May 2014), which reported prevalences of 65.75% for dental caries and 26.03% for dental fluorosis.

In the work of Silva et al. (2020), 260 medical records of children aged 0 to 12 years treated at the children's clinic II of the dentistry course at UFCG, on the Patos-Paraíba campus, were evaluated, a significantly larger sample than that of the present study, which had only 9 participants between 9 and 13 years old. The objective of the study by Silva et al. (2020) was to determine the prevalence of Developmental Enamel Defects (DDE), including dental fluorosis, and the researchers found a prevalence of 30.6%, lower than the 44% observed in this work. In addition, no association with gender was identified, and the main complaints of the patients included dental pain (36.1%), aesthetics (5.6%),

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malocclusions (8.3%), prevention (11.1%), and treatment (25%). However, the study by Silva et al. did not specify which instrument was used to assess dental fluorosis, unlike this study, which used the Dean index. Therefore, comparisons between the two studies should be made with caution, as there may be divergences in the methodological designs. It is important to note that the city of Patos-PB does not have a fluoridated water supply, which may explain the lower prevalence of dental fluorosis observed. In contrast, the city of Janaúba serves 90% of households with fluoridated water, as indicated by the Municipal Decennial Education Plan.

The study conducted by Peixoto et al. (2014) in Manoel Vitorino - BA analyzed the prevalence of dental caries and fluorosis in 73 12-year-old children, using descriptive and cross-sectional methods. Caries and fluorosis indices were applied, and socioeconomic data were collected through questionnaires. The results showed that 38% of the children had caries and 12% had fluorosis. Contrasting these data with those of this and other studies, it is observed that the prevalence of oral diseases is strongly associated with socioeconomic factors and the area of residence.

The study carried out at the Dental School Clinic of the Fametro University Center in Manaus-AM by Pereira et al. (2023), retrospectively analyzed the dental records of 152 children between 3 and 12 years old, most of whom were predominantly brown (70%) and 52% with a monthly family income of up to one minimum wage. These findings are similar to those of this study, which found 60% of brown children and 30% with a monthly income of up to one minimum wage. As in this study, the sociodemographic and socioeconomic variables were collected through the answers of the parents or guardians. However, while in this study dental caries was assessed by the DMFT index, Pereira et al. (2023), used the ICDAS system. The main reasons for seeking care were routine consultations, followed by dental caries and toothache, with the most frequent treatments being prophylaxis, glass ionomer cement restorations, and tooth extractions. These data highlight that the main users of the services offered by pediatric dentistry clinics in dental education institutions are, for the most part, children of mixed ethnicity and in situations of socioeconomic vulnerability. Corroborating the findings of Peixoto et al. (2014), which highlight the high prevalence of caries in children, they emphasize the importance of higher education institutions in complementing access to dental services, especially for children in situations of socioeconomic vulnerability.

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The analysis of the sample reveals that most families are composed of four to six people and have an income of up to two and a half minimum wages. This corroborates what was observed by Pereira et al., 2023, that there is greater access to dental services offered in dental school clinics by children from low-income families, which contributes to positive results with regard to prevention and oral health care and highlights the difficulties in accessing dental services, despite the expansion of the offer by the SUS. Higher education institutions play a crucial role in complementing the population's access, especially for children in situations of social vulnerability, offering treatments that are often unavailable in primary care, ranging from early diagnosis, treatment to periodic follow-up with return appointments for oral health education and health promotion.

It is essential that coordinated actions be implemented between public health agencies, educational institutions, and the community to raise awareness about the importance of oral hygiene, proper use of fluoride, and access to dental care services. In addition, more effective preventive strategies and intervention programs should be developed that address the specific needs of the most affected populations, aiming to reduce the prevalence of dental caries and fluorosis and improve the quality of life of children. The study by Pereira et al. (2021) demonstrated, with statistical significance, that the presence of caries and the need for treatment negatively affected children's quality of life, especially in the domains of oral symptoms, emotional well-being, and functional limitation, as assessed by the Oral Health-Related Impact on Quality of Life (HRQoL) instrument, data that corroborate the work of Silva et al. (2020), who evaluated the parents' perception of the quality of life of children attended at the school clinic at the Dental Complex of the Catholic University Center of Quixadá – UNICATÓLICA – Quixadá, Ceará, where they evaluated 20 children aged 6-12 years, using the HRQoL, concluded that the entire sample evaluated had a negative impact on the quality of life according to parents/guardians associated with the high DMFT index of 6.75, a value much higher than that found in the sample of this study, which did not assess quality of life.

In the study by Jagher et al. (2016), conducted with 87 children aged 3 to 12 years treated at the children's clinic of the Faculty of Dentistry of the Federal University of Pelotas, the use of fluoride toothpaste was evaluated. Using an illustrative leaflet on the ideal amount of toothpaste, the parents or guardians were invited to apply it to the children's brush. The results showed that most children used fluoride toothpastes at the appropriate dose and concentration when dispensed by their parents. However, those responsible did

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not know the correct age for the introduction of fluoride dentifrice. In addition, 68% of the children were responsible for handling the toothpaste and brushing themselves, and 73.6% put the toothpaste on the brush on their own. These findings reinforce the results of this study, which also point to the lack of knowledge of parents about the appropriate age to start using fluoridated toothpaste, expanding the window of opportunity for the development of dental caries. The fact that children handle the toothpaste without supervision, conventionally controlling the amount and brushing alone, also increases the risk of swallowing the product, increasing the risk of developing fluorosis.

There were difficulties in comparing the results of this study with others in the literature due to the lack of publications that used a broad age range such as the one in this study. In oral health surveys, the index ages used are generally those recommended by the WHO (WHO, 1997), which was not possible in this study due to the low number of children attended at the School Clinic during the data collection period. Due to the remnants of the COVID-19 pandemic, this was one of the limitations of this study, since the sample became quantitatively small. To minimize bias due to sample size, we chose not to use hypothesis tests, which could generate associations that do not reliably represent the population studied. For future studies, an approach in a specific age group recommended by the WHO and the use of a sample size that allows statistical inferences to be made are suggested.

CONCLUSIONS

This study showed a high prevalence of dental caries (88.88%) among children attended at the School Clinic of Faculdade Funorte de Janaúba-MG. The presence of caries was more marked in children from families with a monthly income of up to two minimum wages, highlighting the correlation between unfavorable socioeconomic conditions and the higher prevalence of caries. Dental fluorosis was observed in 44.44% of the participants, with grades ranging from very mild to moderate, indicating an inadequate fluoride exposure. In addition, the analysis of the parents' educational level revealed that most had completed high school, indicating a possible gap in oral health education that can be addressed through educational programs.

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