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CARIES PREVALENCE AMONG ADOLESCENTS IN MUNICIPAL SCHOOLS IN BLUMENAU – SC

PREVALÊNCIA DE CÁRIE EM ADOLESCENTES DAS ESCOLAS MUNICIPAIS DE BLUMENAU – SC

Márcia de Freitas Oliveira[1]*, Bruna Camile Maahs[2], Nathália dos Santos Dórea[2], Luiza de Souza e Silva[3]

[1]PhD in Pediatric Dentistry and lecturer in the Department of Dentistry at the Regional University of Blumenau, FURB. [2]Graduate in Dentistry, Regional University of Blumenau, FURB. [3]MSc in Collective Health, Regional University of Blumenau, FURB.

***Corresponding author**: Márcia de Freitas Oliveira – **Email:** marciaoliveira@furb.br

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ABSTRACT: Dental caries is a multifactorial disease involving biological, behavioural, socio-economic and environmental factors. Adolescence, a period of great change, is a risk period for habits that are detrimental to oral health. A study carried out in Blumenau, Santa Catarina, in 2023 examined the prevalence of caries in 538 adolescents aged between 10 and 15 years. The DMFT and dmfs indices were used to assess caries experience in permanent and primary teeth, respectively. The results showed a caries prevalence of 33% in permanent teeth and 50.96% in milk teeth, with girls being more affected. The mean DMFT was 0.32 and the mean DMFS was 1.96. Despite the low prevalence of dental caries, the study highlights the importance of continued prevention during adolescence.
KEYWORDS: Adolescence. Dental caries. Schools. DMFT Index. Oral Health.

RESUMO: A cárie dentária é uma doença multifatorial, que envolve fatores biológicos, comportamentais, socioeconômicos e ambientais. A adolescência, fase de grandes mudanças, é um período de risco para hábitos que prejudicam a saúde bucal. A pesquisa realizada em Blumenau, Santa Catarina, em 2023 investigou a prevalência de cárie em 538 adolescentes entre 10 e 15 anos. Foram usados os índices CPOD e ceo-d para avaliar a experiência de cárie em dentes permanentes e decíduos, respectivamente. Os resultados mostraram uma prevalência de cárie de 33% nos dentes permanentes e 50,96% nos decíduos, com as meninas sendo mais afetadas. A média de CPOD foi 0,32 e a de ceo-d foi 1,96. Apesar da baixa prevalência de cárie, a pesquisa destaca a importância da prevenção contínua durante a adolescência.
PALAVRAS-CHAVE: Adolescente. Cárie dentária. Escolas. Índice CPO. Saúde bucal.

INTRODUCTION

Dental caries is a multifactorial disease involving biological, behavioral, socio-economic and environmental factors that affects the general population[1]. Carious lesions develop due to changes in chemical reactions in the mouth, which lead to pH reduction. This acidic environment causes the dissolution of teeth minerals. There-fore, caries are the result of an imbalance between the minerals present in the teeth and the fluids present in the plaque and mouth[2]. This process is not only influenced by eating habits and oral hygiene practices but also by social and economic conditions, such as access to health services, education, and income, which determine food choices and access to preventive care[3]. The exaggerated consumption of industrialized foods with high carbohydrate and sugar levels, combined with a lack of dental care and poor living conditions, contribute to the prevalence of carious lesions, which are also the result of social inequalities[4].

According to the World Health Organization (WHO), caries affect almost half of the world's population, i.e., 45% or 3.5 billion people worldwide, throughout life, from childhood to old age[5]. The latest SB Brasil national study, conducted by the Ministry of Health in 2023 found a 66.20% prevalence of caries among adolescents aged 15 to 19 years and an average DMFT of 3.41, with the Central-West and North regions presenting the highest rates and the South and Southeast regions the lowest. For adolescents aged 12 years, the prevalence of caries was 50.12%, and the mean DMFT was 1.67, with the Central-West and North regions presenting the highest rates and the South and Southeast regions the lowest[6].

Adolescence is a transition period marked by intense physical and psychological transformations. During that time, individuals can adopt behaviors that compromise their health. A relevant aspect of that concerns oral health, which is dependent on good hygiene habits and which, if not done properly, makes adolescents more prone to develop caries[7]. When left untreated, dental caries can impact the quality of life of adolescents. Failure to treat the disease early can lead to intense pain, discomfort, and even loss of dental element[8].

The purpose of this study is to assess the prevalence of dental caries in adolescents aged 10 to 15 years in the municipal schools of Blumenau - SC, in 2023.

METHODOLOGY

This is a cross-sectional, quantitative study with adolescents aged 10 to 15 years, enrolled in the municipal school system of Blumenau, Santa Catarina, Brazil, in 2023.

The study was conducted with a calculated sample of adolescents enrolled from the 5th to 9th grade of municipal schools in Blumenau. Considering a total of 11,865 adolescents enrolled, 2,561 in the 5th year and 9,304 from the 6th to the 9th year, according to data of 2023 from the Municipal Department of Education (SEMED), the sample was defined using the OpenEpi statistical analysis tool[9]. The calculation considered a prevalence of caries of 76%, based on the Pesquisa Nacional de Saúde Bucal do Brasil (Brazilian National Oral Health Survey)6 for adolescents, with a type-1 margin of error of 5% and a confidence level of 95%. To compensate for possible losses, a reserve of 20% was added, resulting in a final sample of 494 adolescents.

The variables considered in this study were sociodemographic, obtained from the class report generated by the SEMED system. Gender, age group, school year, and hours were analyzed. The prevalence of dental caries was determined by clinical oral examination performed in the school environment, following the guidelines of the Pesquisa Nacional de Saúde Bucal (National Oral Health

Survey) and the recommendations of the 4ª edition of the Oral Health Surveys – Basic Methods by the World Health Organization (WHO)[10].

The tests were conducted by three trained evaluators, using headlamps with the support of a trained annotator. The adolescents were examined individually, in a sitting position, ensuring their privacy. To ensure biosafety, protocols were adopted, including the use of disposable gloves, masks, caps, and wooden tongue de-pressors.

The prevalence of dental caries was assessed by calculating the Index of De-cayed, MiFilled Permanent Teeth (DMFT) =[11]. Only permanent teeth that presented the disease at the cavitation level were considered as having caries lesions. The DMFT indices were calculated using the diagnostic criteria proposed by the WHO for epidemiological surveys in oral health (WHO,1999)[12].

The DMFT index, in use since 1930, evaluates the presence of caries in the permanent dentition, representing decayed teeth (D), missing teeth due to caries (M), and filled teeth (F). The index is calculated from the sum of the DMFT or dmfs of each individual examined, and the average of a population is calculated by the sum of the DMFT or dmfs of all individuals, divided by the total of individuals examined. For deciduous dentition, a variation called dmfs is used, not including missing teeth. The interpretation of the results for the 12-year-old population follows WHO criteria: 0.0 to 1.1 is very low; 1.2 to 2.6 is low; 2.7 to 4.4 is moderate; 4.5 to 6.5 is high, and 6.6 or more is very high[12].

The study criterion for inclusion was adolescents in the age group between 10 and 15 years. The criterion for exclusion was wearing braces.

The data for this study were entered into Microsoft Office Excel ®, tabulated, and submitted to a descriptive analysis including mean, median, and mode measurements.

This study followed guidelines and regulatory standards for research involving humans (CAAE: 37003820.2.0000.5370/decision n.º: 4574897). The people in charge and the participants signed the "Informed Consent Form" and the "Permission Term", respectively before data collection.

RESULTS

The sample selected for this study consisted of a total of 538 adolescents. From that total, 246 were male (45.7%) and 292 female (54.3%), as observed in Figure 1.

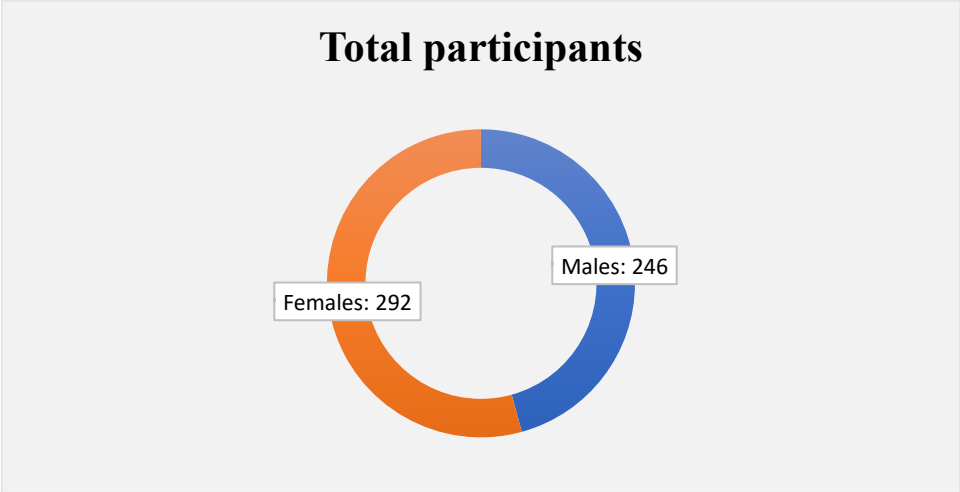

Figure 1. Total number of adolescents according to sex. Blumenau, Santa Catarina, Brazil. Source: Authors.

The prevalence of dental caries in permanent teeth, in mixed or permanent dentition, of the 538 adolescents examined corresponded to 33% represented by DMFT greater than 0. On the other hand, 67% had a DMFT equal to 0. The mean DMFT in adolescents was 0.32. The number of adolescents of different ages, in years, according to the DMFT index is shown in Figure 2.

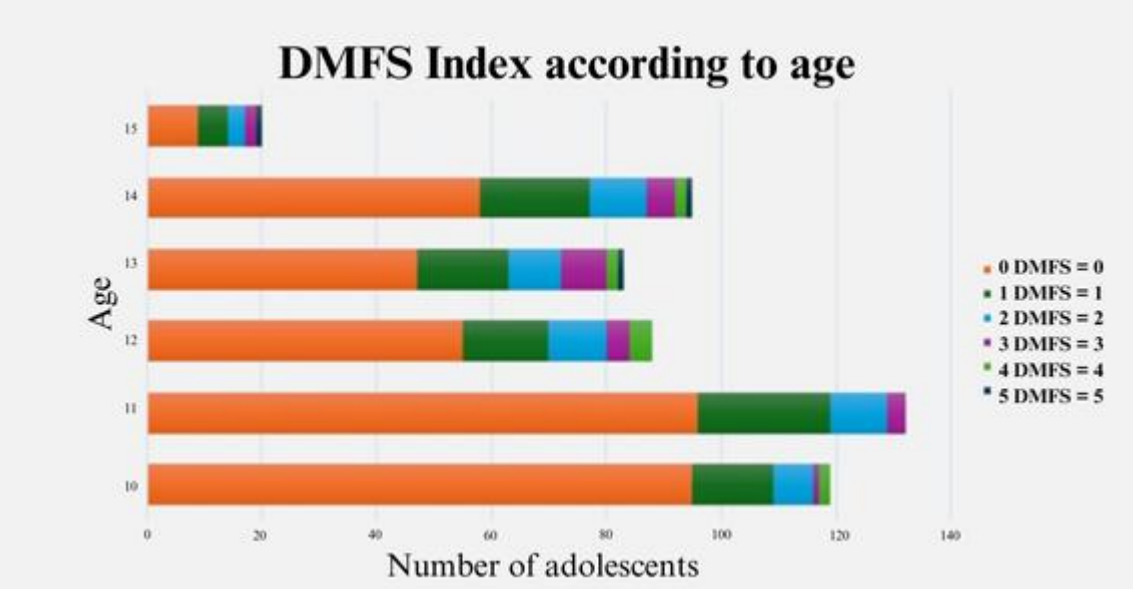

Figure 2. Number of adolescents of different ages, in years, according to the DMFT index. Blumenau, Santa Catarina, Brazil. Source: Authors.

The presence of dental caries in the deciduous teeth of the 79 adolescents examined who had mixed dentition corresponded to 50.96%, represented by the DMFS greater than 0. On the other hand, 49.04% had a DMFS equal to 0. The mean DMFS for adolescents who had mixed dentition was 1.96. The number of teeth with a DMFS other than A (healthy) is shown in Figure 3.

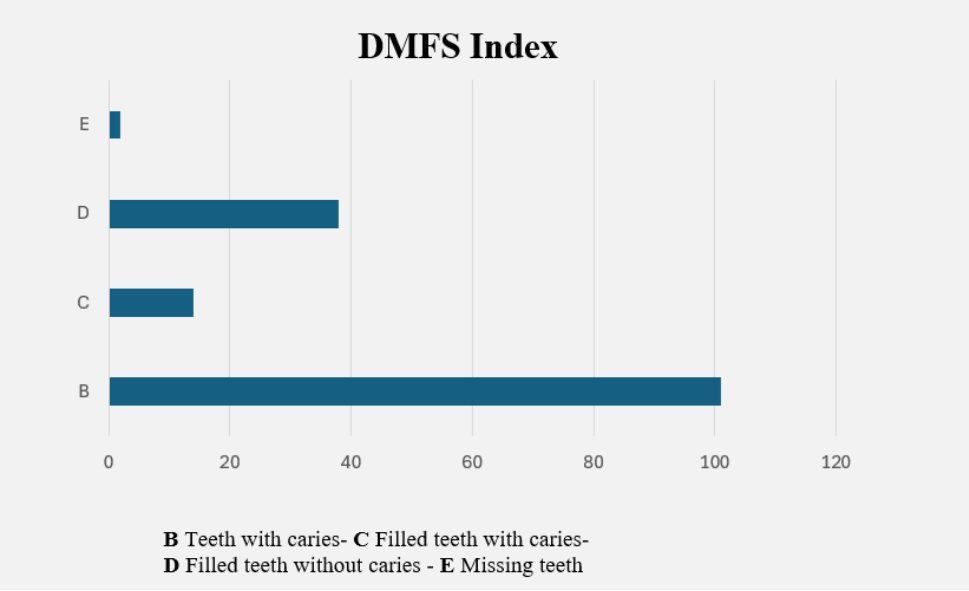

Figure 3. Number of teeth with a DMFS other than A (healthy). Blumenau, Santa Catarina, Brazil. Source: Authors.

Regarding the DMFT index by sex, we recorded the presence of caries in 71 boys and 107 girls. In the DMFS index, caries were identified in 34 boys and 44 girls.

Of the total of 538 adolescents, 246 boys participated in the study, of which 105 were diagnosed with caries, either in the mixed or permanent dentition. Among the 292 participating girls, 151 presented the disease, either in mixed or permanent dentition (Figure 4).

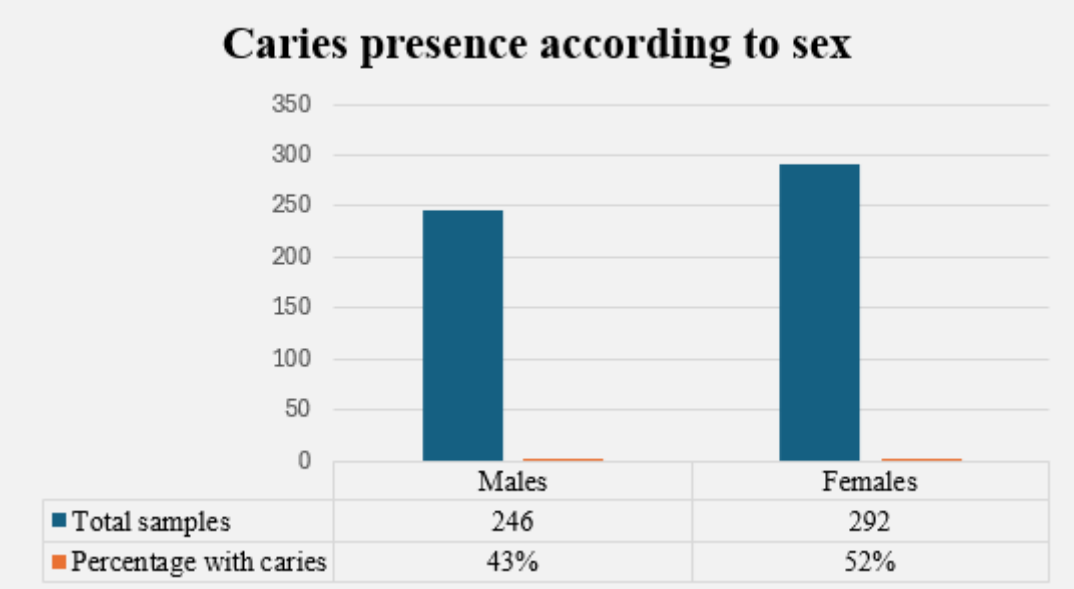

Figure 4. Presence of caries in deciduous and permanent teeth according to sex. Blumenau, Santa Catarina, Brazil. Source: Authors.

DISCUSSION

This study found a mean DMFT classified as very low, according to the WHO target 10, for adolescents aged 10 to 15 years from municipal schools in Blumenau - SC, in 2023. The values obtained were also lower than those recorded in SB Brazil, both in the national mean and in the mean for the South region. The highest prevalence of caries was in females. For adolescents who had mixed dentition, half had caries in deciduous teeth. In relation to permanent teeth, one-third presented caries.

In 2001, an epidemiological study carried out in Blumenau evaluated the prevalence and severity of dental caries based on the WHO criteria and found a mean DMFT of 1.46 at 12 years of age in public schools[13]. In the present study, conducted in 2023, we found a lower mean compared to the study by Traebert et al. in 2001. This decrease may be related to the fact that the city of Blumenau has increased the number of Family Health Strategy (ESF - Estratégia Saúde da Família) teams from 66 to 116, now distributed in 58 Family Health facilities. This increase allows the entire city to be covered by primary care services, reaching coverage of 100% of the territory, which facilitates the promotion of oral health and guidance to the population on the prevention of dental caries[14].

In 2014, the city of Blumenau stood out thanks to the work developed in health, especially in the prevention and maintenance of oral health among children. The “Melhores Práticas em Saúde Bucal” (Best Practices in Oral Health) award is an initiative of the State’s Regional Council of Dentistry. Blumenau stood out thanks to the “Projeto Sorriso”, through which 30 thousand students benefited from the maintenance of oral health[15]. Schools have a high concentration of adolescents, offering a favorable environment for the implementation of intersectoral actions, such as in education and health. These actions provide an ideal opportunity to perform diagnoses through epidemiological

surveys and specific interventions. The goal of those actions is to reduce the prevalence of dental caries among these young people[16].

We found that the prevalence of dental caries was higher in females. A possible cause can be attributed to variations in the composition of the oral microbiota, which found a higher concentration of microorganisms linked to cariogenic activity in girls compared to boys. Among the main bacterial agents related to the development of caries in children, the Actinobaculum, Atopobium, Aggregatibacter, and Strepto-coccus stood out[17]. Therefore, although the prevalence of caries was higher among girls, it is important to consider that the number of female participants was higher than that of males in this study.

The chronology of dental eruption may show variations between the sexes. Considering the time of eruption of deciduous teeth, a study conducted in Itajai (SC) revealed that the girls completed the cycle of eruption of deciduous teeth more quickly than the boys. The total period for tooth eruption was 20.30 months for boys and 19.55 months for girls, suggesting that genetic factors can play a role in this process[18]. This fact may explain the higher prevalence of caries in girls in the present study.

On average, the first permanent molar also tends to appear about 5 months earlier in girls than in boys. This difference can be even more significant in certain cases. This anticipation is associated with the accelerated pace of biological development that occurs in girls during pre-puberty and puberty. As for the lower molars, they usually appear before the upper ones in both genders, signaling the beginning of the phase known as mixed dentition[19].

It was observed that the DMFS index presented a higher prevalence of caries, this is due to the fact that the deciduous teeth are less resistant to caries because of the difference in their structure and composition compared to the permanent teeth; therefore it is crucial to maintain a proper diet and hygiene from early childhood. According to the findings of Lima et al., 2020, the Southern region of Brazil has a mean DMFS of 2.56, while the results of this research show a mean of 1.96 in Blumenau in 2023[20].

This study found that although the average DMFT was very low, some adolescents had high DMFT indices, higher than 4. This is in line with epidemiological studies that found a decrease in dental caries rates among Brazilian children, but with a small portion of the population with more severe cases of caries, which still characterizes the presence of polarization of the disease[21]. Economic and social disparities, as well as the unbalanced distribution of dental caries in Brazil, contribute to the dis-proportionate prevalence of this condition among several areas or segments of the population[22].

Although this study found a decrease in the mean DMFT and a figure below the WHO target, adolescence is considered a period of higher-risk behavior for dental caries. Poor control of bacterial biofilm, reduction of oral hygiene monitoring by parents, and a sugar-rich diet available in the environments frequented by adolescents may increase the likelihood of caries lesions[23]. Thus, epidemiological studies must be carried out continuously, since the population in schools is constantly renewed and prevention is always the best option to maintain health.

A limitation of this study was its sample, restricted to municipal schools, excluding state and private institutions. However, most adolescents in Blumenau are enrolled in municipal schools, which provides a significant representation of this demographic.

CONCLUSION

This study allowed an assessment of the prevalence of dental caries in adolescents aged 10 to 15 years, enrolled in municipal schools in Blumenau, Santa Catarina, during the year 2023. The results pointed to a prevalence of dental caries, based on the DMFT index, classified as very low according to

WHO standards. How-ever, despite the lower mean, disparities were observed, including a higher prevalence of caries in female adolescents.

Although there has been a trend of improvement in dental caries rates among adolescents in Blumenau, it is important to continue and intensify initiatives for prevention and education in oral health. Epidemiological studies are necessary to monitor the evolution of the disease and adjust interventions as needed, ensuring constant progress in the oral health of the young population.

A future study could compare the DMFS and DMFT indices of adolescents from municipal, state, and private schools in the city, taking into account socioeconomic and demographic data, in addition to the diet of students, to identify predisposing factors to caries.

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