

Original Article

Prevalence and Comparison of Dental Caries of 6 to 12 Years Age in Government and Private School Children of Peshawar City, Pakistan

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ABSTRACT

Background: Dental caries remains a significant public health issue globally, affecting both developed and developing nations. Studies have shown varying prevalence rates based on geographic, socioeconomic, and cultural factors, particularly among school-aged children. The city of Peshawar, with its diverse population, provides a unique setting to study these variables in relation to oral health outcomes among children.

Objective: This study aimed to determine the prevalence of dental caries among school children aged 6 to 12 years in Peshawar, Pakistan, and to compare the rates between students from government and private schools. Additionally, the study sought to explore the association of dental caries with dietary habits, particularly the consumption of sweets, chocolates, and candies.

Methods: A cross-sectional study was conducted involving 376 school children from both government and private schools in Peshawar. Participants underwent detailed oral examinations to assess for dental caries, and data on their dietary habits were collected through questionnaires. Informed consent was obtained from parents or guardians according to the Declaration of Helsinki. The Statistical Package for the Social Sciences (SPSS) Version 22 was used for data analysis, employing descriptive statistics to calculate frequencies, percentages, and mean values.

Results: The overall prevalence of dental caries among the participants was 55.05%. Boys exhibited a slightly higher prevalence (53.2% in males compared to 62.7% in females). The consumption of sugary snacks was significantly associated with the presence of caries; 95.6% of carious children regularly consumed sweets, chocolates, or candies. There was no significant difference in caries prevalence between children from government (53.2%) and private schools (57.5%).

Conclusion: The study highlights a high prevalence of dental caries among school-aged children in Peshawar, which correlates strongly with sugar consumption but not with the type of school attended. These findings underscore the need for targeted public health interventions to reduce sugar intake and improve oral hygiene among children.

Keywords: Dental Caries, Child Oral Health, Peshawar, Sugar Consumption, School Children, Cross-Sectional Study, Oral Hygiene, Public Health.

INTRODUCTION

Proper oral hygiene is integral to overall health, with the oral cavity playing a crucial role in systemic health. It facilitates essential functions such as eating, speaking, and esthetics, enabling individuals to communicate without discomfort or embarrassment. Despite widespread knowledge and advances in dental science, oral health issues remain prevalent globally, affecting populations in both developed and developing countries (1). Dental caries, oral cavity lesions, periodontal diseases, tooth loss, oral cancer, and traumatic injuries are among the primary oral health complaints reported worldwide (2, 3).

Dental caries, also known as tooth decay, is often misconceived merely as cavities within teeth rather than as a comprehensive disease process. Historically, it has been understood that caries result from the action of bacteria on sugary foods, leading to acid production that destroys tooth enamel. This understanding has evolved over the past decade, with a clearer depiction of the role of

microorganisms like bacteria in fermenting sugars to produce lactic acid, thereby lowering the pH in the oral cavity below the optimum level of 5.5, a process known as demineralization (4, 5). The primary acidogenic bacteria involved are *Streptococcus mutans* and *Lactobacilli* species, which thrive in acidic environments and are pivotal in the progression of dental caries (6, 7).

The epidemiological studies have pointed out that carbohydrates, particularly sucrose, are major contributors to tooth decay, facilitated by bacterial activity, notably by *Streptococcus mutans* (8, 9). Dental caries is characterized as a chronic local destruction of dental tissues by cariogenic bacteria. The fermentation of sugary foods by these bacteria leads to acid production, which initiates the demineralization of the tooth's inorganic components and the destruction of organic substances, often resulting in cavitation (10, 11).

The disease's multifactorial nature is influenced by various risk factors including age, sex, oral hygiene, and dietary habits. Factors such as socio-economic status and educational background also play significant roles in influencing dietary choices and oral hygiene practices (12, 13). Regular tooth brushing and exposure to fluoride are widely recognized for their preventive benefits against dental caries, with fluoride treatment being particularly noted for its effectiveness in reducing caries incidence in socioeconomically disadvantaged children (14).

The concept of dental caries has been well-established since Miller's chemo-parasitic theory in the 1890s and further defined in the 1960s through the illustration of the interplay between tooth structure, diet, and plaque (9). The balance between demineralization and remineralization of teeth is crucial and heavily influenced by dietary intake. Foods rich in sugars and carbohydrates foster the proliferation of acidogenic bacteria, enhancing demineralization, whereas diets low in these components and high in calcium can aid in the remineralization process (10).

Globally, dental caries remains a pervasive issue, described by the World Health Organization as an epidemic, with a prevalence of 60 to 90% among school-aged children (16). The burden of dental caries extends beyond mere discomfort, affecting essential functions such as eating, speaking, and sleeping, and imposing significant economic burdens on families due to treatment costs (3, 9). The prevalence of dental caries varies widely across different regions, with some developed nations showing lower incidence rates due to better oral hygiene practices and preventive measures such as fluoride intake (29-32).

MATERIAL AND METHODS

The study was conducted as a cross-sectional investigation aimed at assessing the prevalence of dental caries among school children aged 6 to 12 years in Peshawar city, Khyber Pakhtunkhwa, Pakistan. The research setting included both government and private schools within the city. For data collection, a total of 376 students were selected through a systematic sampling technique to ensure representativeness of the population. The study spanned from March to July 2021 during which all assessments were completed (19).

Prior to data collection, informed consent was obtained from the parents or legal guardians of all participating children, following the ethical guidelines stipulated in the Declaration of Helsinki for medical research involving human subjects. Each participant underwent a detailed oral examination to identify signs of dental caries, and a comprehensive dental history was recorded. The oral assessments were carried out using standard dental examination tools and techniques by trained dental professionals (27).

For data analysis, the Statistical Package for the Social Sciences (SPSS) version 22 was utilized. Descriptive statistics, including means, frequencies, and percentages, were calculated to summarize the data. The results were visually represented through various graphical formats such as bar graphs and pie charts to illustrate the distribution and prevalence of dental caries among the study cohort. This approach facilitated a clear understanding of the impact of dental health across different school settings, contributing to a better understanding of oral health disparities among children in Peshawar.

RESULTS

The study revealed significant findings regarding the prevalence of dental caries among school children aged 6 to 12 in Peshawar. Gender-wise distribution of dental caries (Table 1.2) showed that of the total 376 children examined, 293 were male and 83 were female. Among the males, 156 were found to have caries, constituting 53.2% of the male sample, while 137 males (46.8%) did not. In contrast, the female group presented with a lower number of carious cases, where 52 out of 83 (62.7%) had caries, and 31 (37.3%) were caries-free.

The analysis of dietary habits related to the consumption of sweets, chocolates, and candies demonstrated a strong correlation with the occurrence of dental caries (Table 1.3). Out of the 206 children with caries, a substantial majority, 197 children (95.6%), consumed these sugary treats. Conversely, only 9 children (4.4%) with caries did not report consuming such snacks. This contrasted with the group without caries, where 157 of the 170 children (92.4%) who did not have caries also consumed sweets, indicating other protective factors might be in play.

Table 1- Gender Distribution of Dental Caries Among Children

Gender	Cariou (Yes)	Cariou (No)	Total
Male	156	137	293
Female	52	31	83
Total	208	168	376

Table 2- Association Between Consumption of Sweets, Chocolate, Candy and Dental Caries

Cariou Status	Consumes Sweets, Chocolate, Candy (Yes)	Consumes Sweets, Chocolate, Candy (No)	Total
Yes	197	9	206
No	157	13	170
Total	354	22	376

Table 3- Comparison of Dental Caries in Government vs. Private School Children

School Type	Cariou (Yes)	Cariou (No)	Total
Government	101	89	190
Private	107	79	186
Total	208	168	376

Furthermore, the comparison between the prevalence of dental caries in government versus private school settings (Table 1.7) indicated an almost equal distribution among the two environments. In government schools, 101 out of 190 children (53.2%) had caries, and 89 children (46.8%) did not. Similarly, in private schools, 107 out of 186 children (57.5%) presented with caries, while 79 children (42.5%) were free from dental caries. This data suggests that the type of school, whether government or private, does not significantly influence the prevalence of dental caries, underscoring the ubiquity of this condition across different educational settings.

Overall, the results underscore the widespread issue of dental caries among children in Peshawar, with significant implications for public health strategies aimed at reducing sugar intake and promoting regular dental check-ups to mitigate this prevalent health concern.

DISCUSSION

The study identified a significant prevalence of dental caries in school-going children in Peshawar, with an overall rate of 55.05%. This finding is consistent with a similar study conducted in Karachi, where the prevalence was reported to be the same among six-year-olds and slightly lower at 44.6% among twelve-year-olds. The higher prevalence in the Karachi study could be attributed to the larger sample size employed (30). Similarly, a study from India reported a prevalence of 42%, indicating a slightly lower rate compared to our findings and other global studies (31). These variations underscore the influence of regional dietary habits, oral hygiene practices, and access to dental care on the prevalence of dental caries.

In terms of gender distribution, our study found a higher prevalence of caries among boys, aligning with the findings from the Karachi study, which also reported a male predominance in dental caries (30). This pattern may reflect behavioral differences in dietary habits and oral hygiene practices between genders. The correlation between high sugar consumption and the prevalence of dental caries is well-documented and was evident in our findings. Children who frequently consumed sweets, candies, chocolates, and sugary beverages showed a higher incidence of tooth decay. This relationship highlights the critical role of diet in oral health, emphasizing the need for improved public health strategies to reduce sugar intake among children (32).

A comparative study by Jamieson indicated even higher prevalence rates, with figures reaching up to 88% among younger age groups in a hospital-based study (33). This discrepancy likely reflects the targeted nature of hospital-based studies, which often involve participants with existing health concerns, thereby reporting higher prevalence rates.

Historical data from Europe during the late 1980s and early 1990s suggest that the decline in dental caries had plateaued, and in some cases, even increased in populations with an average DMFT score below 2.0 (34). This stagnation could be due to various factors, including changes in dietary habits and public health policies. The study's strengths lie in its systematic approach and substantial sample size, providing a robust dataset for analyzing caries prevalence among a diverse school population. However, limitations include the cross-sectional design, which restricts the ability to establish causality between observed associations. Additionally, the reliance on self-reported dietary habits may introduce bias, as participants might not accurately recall or report their consumption patterns.

CONCLUSION

In conclusion, the study confirms a high prevalence of dental caries among children in Peshawar, with a notable association with sugar consumption and inadequate oral hygiene practices. There was no significant difference in caries prevalence between children attending government and private schools, indicating that socioeconomic factors and school type might not be as influential in this region. To combat the high prevalence of dental caries, it is recommended that public health initiatives focus on reducing sugar consumption, promoting regular dental checkups, and improving oral hygiene education. Further longitudinal studies are needed to explore the causative factors more comprehensively and to assess the effectiveness of preventive measures over time.

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