

Original Article

Prevalence of Dental Caries among Private School Children in Benghazi, Libya (2023)

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ABSTRACT:

Background: Oral diseases are among the most prevalent diseases globally and have serious health and economic burdens, greatly reducing quality of life for those affected. The most prevalent and consequential oral diseases are dental caries. Dental caries is considered a major public health problem in underdeveloped or developing countries. Therefore, the present study aimed at determining the prevalence of dental caries among school children. **Material and Method:** A cross-sectional survey was conducted in the city of Benghazi targeting children among seven private schools, both sexes, all ages, using a systematic sampling, a collection form containing information about socio-demographic characteristics of study participants was used and the children had examined for dental caries by the study investigators for the presence of dental caries depend WHO diagnostic criteria for caries. **Result:** A Total of 917 students included in this study were 56.5% of the student were male and 43.6% female; most of them were from the 5 - 10 age group with 63.6%, with a Mean = 9.95 ± 2.6 standard deviation. The prevalence of dental caries among school children was 43.9%. The dental caries prevalence was significantly associated with age and specific school; the study participants with higher prevalence in the age groups 5-10 years. There was no significant association between gender and dental caries. **Conclusion:** The study concluded that dental caries is common among school children, significantly varying by age and socioeconomic status. These findings highlight the urgent need for targeted prevention and intervention strategies to improve dental health and support overall well-being and academic success.

Key Words: Dental Caries, Prevalence, School Children, Benghazi, Libya

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INTRODUCTION:

Dental caries is a persistent global issue pertaining to oral health. According to the World Health Organization (WHO), dental caries affects 60–90% of school-age children globally and 100% of adults. Early childhood caries is considered a global issue [1]. Dental caries can affect anybody; however, it most commonly affects children and teenagers. Some low- and middle-income nations have observed a link between dental caries and under-nutrition in children; however, it is unclear if this is a cause-and-effect relationship, or if it is both [2]. Early childhood caries (ECC) is a type of dental caries in the teeth of infants and children that is represented as one of the most prevalent dental problems [3]. Caries lesions are linked to a variety of causes, such as behavioral, biological, and socioeconomic factors [4]. The Eastern Mediterranean Region of the World Health Organization (WHO) has had the prevalence of dental caries evaluated by a number of studies. In nine nations in the Eastern Mediterranean Region of the World Health Organization (WHO), dental caries is still a problem for children's oral health [5]. The rising economic growth in Arab nations over the past few decades have led to increasing access to unhealthy foods and sugar intake, which has been linked to an increase in the prevalence of caries [6]. Dietary free sugars can be avoided to prevent dental caries. [2]. Evidence suggests that water fluoridation, which has been widely used for several decades worldwide, reduces the incidence of dental caries. It has been repeatedly demonstrated that using fluoride toothpaste helps prevent dental cavities [7]. According to the Global Burden of Disease 2019, untreated dental caries, or tooth decay, in permanent teeth is the most prevalent medical disease [8]. In addition to long-term consequences that negatively affect quality of life, untreated caries can cause pain, infection, missed school days, issues with speech and language development, and other issues [9].

In Libya

However, little is known about early childhood caries and the risk factors associated with it in Libyan children's primary teeth. A review of the literature showed that there was not much research done in Libya that looked into the risk factors for caries [10]. Libya is no exception, having a high prevalence of dental caries among school children as reported by studies done in Benghazi, Sabha, and Tripoli (77.27%, 61.9 % and 78%, 71%

respectively), [11- 14] however, it was low according to WHO standards, and the prevalence of dental carries higher in boys than girls [11]. Most of the children with caries had untreated decay, and a small percentage had filling or missing teeth due to decay [12]. Dental caries arises from the metabolism of carbohydrates by oral bacteria, which results in the production of acid that demineralizes the tooth's hard structures (dentine and enamel) [2]. This opinion has been supported by a newly published natural experiment that involved children from Libya. The experiment showed a simultaneous decline in sugar availability and caries experience in the permanent teeth of 12-year-olds [15]. This study investigates the prevalence of dental decay among children in private schools in Benghazi, considered to be from the upper social class.

MATERIAL AND METHOD:

Study Design and Setting: This cross-sectional study was conducted in Benghazi, Libya's second largest city, with an estimated population of 600,000. The research focused on seven private schools in the urban area.

Study Population and Sampling: A total of 917 school children from seven private schools were enrolled in the study. Participants were selected through a systematic sampling approach to ensure representative inclusion across different age groups and school grades.

Data Collection Procedures: Trained study investigators collected data using a standardized form that included:

1. Comprehensive socio-demographic characteristics
2. Detailed dental examination records

Clinical Examination: All participants underwent thorough oral examinations conducted by qualified dental professionals. Examinations followed the WHO criteria for dental caries diagnosis, assessing:

- Presence of carious lesions
- Tooth condition (Decayed, missing, or filled)

Data Analysis: The collected data were input and analyzed with SPSS version 23.[16] This included both descriptive and inferential statistics, with significance set at $p \leq 0.05$. The results were presented in tables and figures.

Ethical Considerations: Anonymous self-completion questionnaires were utilized to maintain the confidentiality of the collected information. Verbal consent was obtained from all parents, students, and the headmaster of the schools.

RESULT:

This cross-sectional survey was conducted to determine the prevalence of dental caries among a school children aged from 5-18 years in seven private schools at Benghazi, the study found out that: In relation to socio-demographic characteristics, 56.5% of the study participants were male and 43.6% were female, most of them were from 5-10 age groups with 63.6%; with Mean = 9.95 ± 2.6 standard deviation as shown in table (1). The distribution of study participants in relation to their school showed that the majority of them were

from the International School and Al-Nabigha school, with 29.2% and 23.1% respectively, followed by Gheser Al-Marafa and Al-Tamiz school, as illustrated in Figure 1. The prevalence of dental caries among school children was 43.9% as shown in Figure 2. The study reported that the dental caries prevalence was significantly associated with age the study participants with higher prevalence among the study participants in the age group 5 -10 years in comparison to other age groups. There were no differences between girls and boys in getting dental caries. Table 2

Table 1: Distribution of children according socio-demographic characteristics:

Socio-demographic characteristics		Number	Percent %
Gender	Male	517	56.5%
	Female	400	43.6%
Age	5- 10	583	63.6
	11 - 16	302	32.9
	> 16	32	3.5
Total		917	100

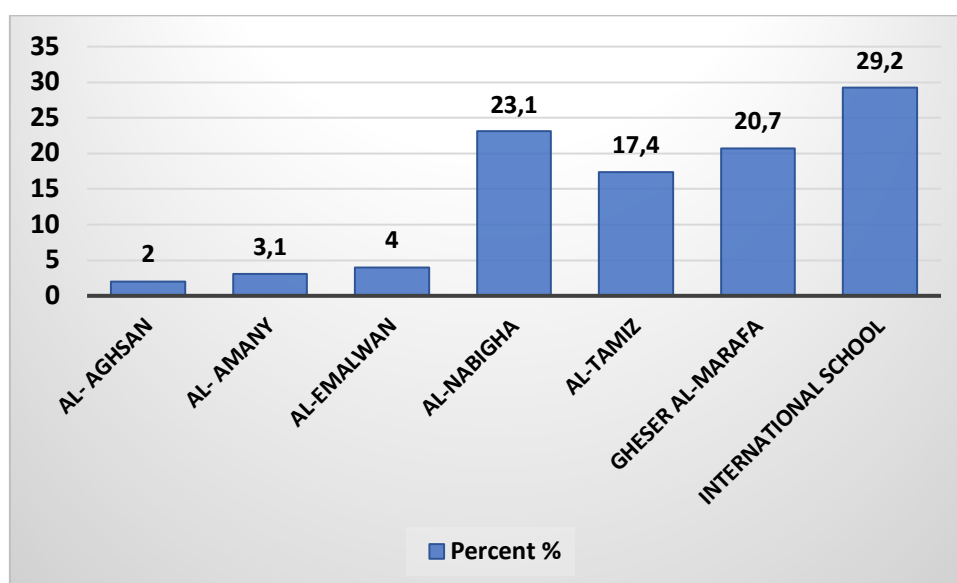


Figure 1: Distribution of study participants in relation to their school:

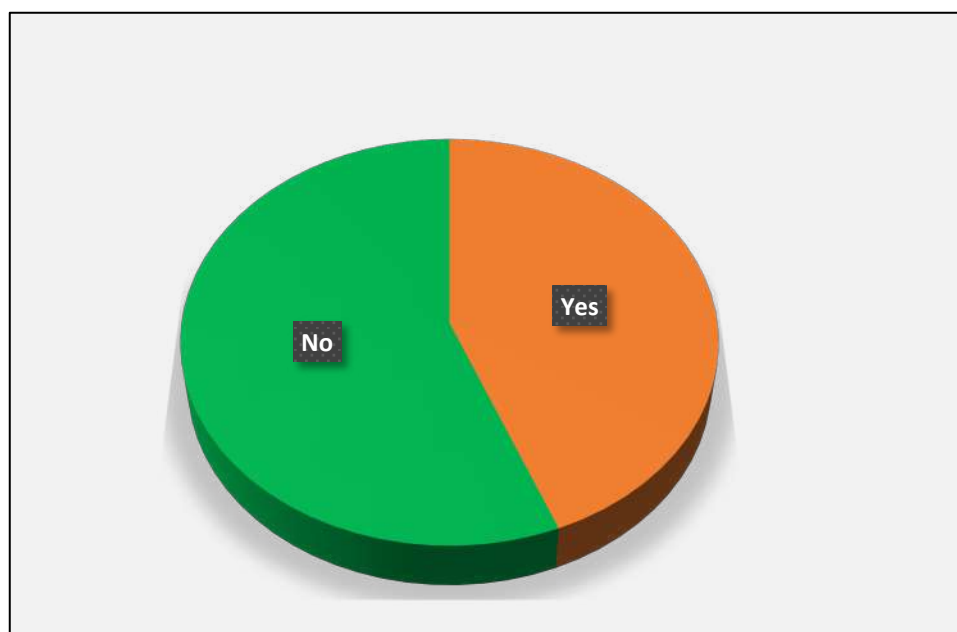


Figure 2: The distribution of dental caries among school children

Table 2: Association between socio-demographic characteristics of study participants and dental caries.

Variable		Dental caries		P- Value
		Yes	No	
Gender	Male	227(43.9%)	290 (56.1%)	0.978
	Female	176(44%)	224 (56%)	
Age	5 - 10	273(46.8%)	310(53.2%)	0.029
	11-16	121(40.1%)	181(59.9%)	
	> 16	9(28.1%)	23(71.9%)	
Total		403	514	-

DISCUSSION:

The current study found out that the prevalence of dental caries among male students was nearly equal to that of female students, with rates of 43.9% for males and 44% for females in which p value was insignificant (0.978). This aligns with findings from Al Sharbati et al. [11]. Alraqiq et al. in Libya [6], and Chuyen et al in Vietnam, which also showed no significant association between gender and dental caries [16]. In contrast, studies in Nepal, Iran, and Egypt, respectively, reported a higher prevalence of caries among males. This increased prevalence in males may be attributed to their greater consumption of sweets and energy drinks both during and outside of school compared to females [17-19]. However, this trend was not replicated in

studies from Saudi Arabia in 2017 and Libya in 2011, where Farsi et al. [20], and Huew et al. [21] found out that females had a higher prevalence of dental caries than males. This discrepancy might be explained by the earlier eruption of permanent teeth in girls, which exposes them to risk factors for dental caries for a longer period. The present study demonstrated a correlation between dental caries and student age, with caries being most prevalent in the 5 to 10-year age group at a rate of 46.8%, followed by a prevalence of 40.1% in the 11–16-year age group. The study found that children aged > 16 were the least affected by dental caries. Various studies in Libya have established a clear relationship between age and dental caries; for instance, Alraqiq et al. in 2021[6] found different

results when comparing first-grade children (6-7 years) with seventh-grade children (11-12 years), reporting that caries rates among first-graders were 30% higher. Similar findings were noted in a meta-analysis by Adam T et al. in 2022, which confirmed that the age group most affected by caries, at a rate of 84%, were children aged 5 to 7 years old [22]. Additionally, a study by Elmaghrawy K et al. in Misurata in 2024 found that the age group most affected among private school children was those aged 3 to 6 years, with a prevalence of 75%, compared to 16.5% for children aged 7 to 13 years old [23]. Conversely, Kabar AM et al. indicated in 2019 that children aged 12 were the most affected compared to those under seven [24]. The overall prevalence of dental caries among study participants was 43.9%. This result aligns with findings from studies in Saudi Arabia by Almutairi B [25]. In India by Rasul J et al [26] and in Pakistan by Ahmed W et al., which reported prevalence rates of 41%, 34.1%, and 45%, respectively, among private school children [27]. In contrast, a descriptive study conducted in 2020 on private school children in Nigeria reported a much lower prevalence of dental caries at 16%. This reduced rate was attributed to the higher socioeconomic status of Nigerian children in private schools, which provides them with better access to refined carbohydrates compared to their counterparts in public schools [28]. According to the available literature, several studies have been conducted in various Libyan cities to assess the prevalence of dental caries among schoolchildren. These studies reported rates of 61.9% and 57.8% in Benghazi in 2000 and 2011, respectively [11, 21]. And 74.7% in Tripoli in 2019 [24]. These findings suggest a notable increase in the prevalence of dental caries among school children in recent years. The differences in prevalence rates between the current study and other national studies may stem from variations in methodology, as most prior research focused on students in public schools. To our knowledge, no studies have specifically targeted the prevalence of dental caries in private schools in Libya. In a 2024 study conducted in Brazil by Guedes et al, a notable disparity in the prevalence of dental caries was found between students attending public and private schools. The study indicated that 28.4% of private school students had dental caries, whereas the prevalence among public school students was significantly higher at 51.5%. This observation aligns with the differences in dental caries prevalence noted in the current study compared to other national studies [29]. Conversely, a 2019 study in China by Cheng et al,

reported that dental caries was more common among private school students than their public-school counterparts. This trend was attributed to increased risk factors, including a higher incidence of elevated body mass index (BMI) among private school students [30]. In contrast, a study by Almutairi et al, in Saudi Arabia, found no significant difference in dental caries prevalence, reporting rates of 42% for public school students and 41% for private school students [25]. Despite being largely preventable, dental caries remain highly prevalent, underscoring significant social and economic disparities and inadequate funding for prevention and treatment, particularly in low-income families. Numerous studies have established a connection between low socioeconomic conditions, family income, and a higher prevalence of dental caries among children. This relationship was highlighted in descriptive studies conducted in Libya (2021), Egypt (2019), and a meta-analysis in Iran (2020) by Kabar A. [24], Abbass M [31], and Soltani et al [32], which showed that students from low socioeconomic backgrounds and low family incomes were at greater risk for dental caries. However, this finding does not entirely reflect the current study, as students in private schools generally come from middle to high-socioeconomic backgrounds. Notably, a higher prevalence of dental caries was observed in two of these private schools, which are considered to have very high standards regarding socioeconomic conditions. Nevertheless, the dental caries prevalence among these students was still relatively high, likely due to their increased access to sweets compared to their peers. This is further supported by findings from Yousaf M et al, which indicated that both low and high socioeconomic status (SES) are linked to an elevated risk of dental caries [33].

CONCLUSION:

This study highlights the significant presence of dental caries among schoolchildren in a private school setting, emphasizing the influence of age and socioeconomic context on prevalence. The findings stress the importance of early prevention and intervention efforts to reduce the burden of dental caries in young populations. Addressing dietary habits, enhancing oral hygiene education, and improving access to preventive dental care are essential steps to promote better oral health outcomes.

Recommendations:

1. This study establishes a foundational data set for promoting and evaluating oral health initiatives in schools in Benghazi.
2. It is important to address dental caries among school children early in their development.
3. Implementing preventive measures and primary interventions is vital to slow the progression of caries.
4. This baseline data will be a valuable resource for future public health research, supporting ongoing

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