

Prevalence of Dental Caries and Associated Etiological Factors among Children Aged 3-12 Years

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Abstract

Dental caries is a chronic disease of the tooth that may cause pain and discomfort and may impair the ability to eat properly. There are numerous distinct reasons that might induce dental caries. The aim of this study was to explore the prevalence of dental caries (DMFT index) and its determining variables among children attending the school dental clinics in Basrah city, Iraq. The cross-sectional investigation was carried out in Pediatric Dentistry Clinics, College of Dentistry, University of Basra. The sample included 230 children aged 3 to 12 years old who attended the clinics in the study period. All clinical examinations were done by the same calibrated examiner using a standard dental operator light, sterile mouth mirrors, and following the guidelines set out by the World Health Organization (WHO). The oral health was evaluated using two different indices, the dmft index of deciduous teeth and the DMFT index of permanent teeth. Data were input and analyzed using the IBM SPSS Statistics program. The data revealed that the prevalence of dental caries was 47% with the highest prevalence in children aged 6–8 years (64%) and the lowest prevalence in children aged 9–12 years (23.2%). There was a slight fall in caries incidence in women compared to men. Highest prevalence of caries (60%) was found in children whose parents had unspecified educational background and lowest prevalence (41.7%) in children whose parents completed secondary education. Children who consumed sugar more than twice a day also had the greatest incidence (66.7%). This study's findings highlight the need for preventative programs in schools, parent education on oral health, dietary recommendations, and frequent dental screenings to lower the prevalence of dental caries in Iraqi children of school age.

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Introduction

The imbalance of oral bacteria, mostly influenced by dietary habits, causes dental caries, a chronic non-infectious condition. This leads to progressive destruction of the tooth structure over time by demineralisation of the hard tissues of teeth [1]. The illness is a consequence of the regular metabolism of fermentable carbohydrates by cariogenic bacteria and the subsequent secretion of acids which cause progressive mineral loss [2,3]. Tooth decay, a disease

that is otherwise preventable, remains a significant public health problem worldwide, particularly in children [4]. If not managed in time, it may affect the child's growth, nutritional status, academic success and general well being. In epidemiological studies, the DMFT/dmft index is used for dental caries recording, measuring decaying, missing and filled teeth in permanent and primary dentition [5]. However, this measure cannot include initial enamel changes that have not developed to cavities and thus may underestimate the real severity

of the illness [6]. Modern dental research is therefore focused on prevention and early risk management, rather than just treating existing caries lesions [7]. Environmental factors, behavior and socioeconomic status are all factors that influence the incidence of teeth caries [8]. Despite advancements in dental health initiatives and the application of fluoride in many industrialized nations, dental caries is still prevalent in low- and middle- income nations. The World Health Organization reports that disparities in health education and access to dental

treatment are major causes of untreated dental caries, the most prevalent oral illness worldwide [9]. A child's socioeconomic situation greatly influences their dental health. Serious oral health issues and teeth caries occurred more often among children from economically disadvantaged backgrounds or parents with less education [10]. High sugar intake, inadequate dental hygiene, and a lack of parental monitoring are all behaviors that are often linked to these sociocultural influences [11]. While several worldwide studies have shown a strong correlation between socio-economic status and teeth caries, there is a dearth of local data from Iraq, particularly from the Basra Governorate, that supports this link. Additionally, no comprehensive study has examined the relationship between dental caries in Iraqi children and behavioral or socioeconomic characteristics. This complicates the process of using local data to build focused preventative programs.

This research set out to assess the prevalence of tooth decay and the underlying behavioral and socioeconomic variables that contribute to it.

Material and Methods

From November 2023 through April 2024, researchers from the Pediatric Dentistry Clinics of the University of Basra's College of Dentistry in Iraq conducted this cross-sectional study. We requested 230 kids (ranging in age from 3 to 12) who came to the Pediatric Dentistry Clinics throughout the study period to take part. The University of Basra's College of Dentistry's Scientific Committee and Institutional Review Board gave their support to the study's procedure. Before any children could join, their parents or legal guardians had to provide their informed permission. All participants' personal and health information was kept completely confidential throughout the trial by employing coded identification. A single calibrated assessor only used sterile mouth mirrors, a standardized dental operating light, and periodontal probes from the World Health Organization (WHO) to conduct all clinical evaluations. Cotton gauze was used to clean and dry the tooth surfaces as needed before inspection. The prevalence of teeth caries was evaluated using the criteria set forth by the World Health Organization for assessments of dental and oral health. Two separate indices, the DMFT index for permanent teeth and the dmft index for deciduous teeth, were used to evaluate dental health since the sample included individuals with a wide range of dentition types and ages (3-12 years). These indices reflect the number of teeth that are decaying (d/D), missing (m/M) due to caries, and filled (f/F). When a cavitated lesion was seen during a clinical examination, it

was determined that the tooth was rotting. Deteriorated teeth were those that received restorations but still had recurring caries. To collect demographic and socioeconomic data, a systematic survey was conducted with parents or guardians via in-person interviews. Age, gender, parental education level (preschool, primary, secondary, or tertiary), frequency of sugar consumption and frequency of teeth brushing habits were among the data points collected. The severity of decay and the presence or absence of cavities were the primary endpoints. Software developed by IBM, SPSS Statistics, Version 27, was used for data entry and analysis. A p-value below 0.05 was employed to signify statistical significance, and descriptive data were given. To evaluate associations between categorical factors and caries prevalence, the chi-square test was used, and independent t-tests were run for comparisons between two groups.

Results

This research involved an examination of 230 youngsters. The total incidence of dental caries was 47% (n = 108), whereas 53% (n = 122) remained free of caries. The allocation of dental caries by gender is seen in Table 1, where 52.2% (n = 60) of men exhibited caries, whilst 47.8% (n = 55) remained caries-free. Of the women, 41.7% (n = 48) had dental caries and 58.3% (n = 67) had no caries. Though the proportion of caries free females was higher, the difference was not statistically significant (P = 0.146). This suggests that the incidence of caries was similar amongst males and females in this research cohort. Dental caries was most prevalent in children aged (6–8) years, with 64% impacted compared to 36% caries-free (Table 2). In the 3–5 age group, 52.1% (n = 25) had caries and 47.9% were caries-free. Children aged 9–12 had the lowest caries prevalence, 23.2% afflicted and 76.8% caries-free. There was a difference in dental caries prevalence dependent on age (P < 0.001). Table 3 shows the comparison of parental education with dental caries. Children with primary school parents had 46.3% caries and 53.7% caries-free. Children with secondary school-educated parents had 41.7% cavities and 58.3% caries-free. Children of university-educated parents had 47.6% caries and 52.4% caries-free. 60% of children without parental education had caries and 40% did not. There was an association between caries prevalence and parental education level (P = 0.027), with the highest prevalence in the "not specified" category and the lowest in the secondary school. Table 4 shows how sugar consumption affects dental caries. Of youngsters who ate sugar everyday, 25.5% had cavities and 74.5% were caries-free. Sugar twice a day harmed 36.7% of youngsters, whereas 63.3% had no

caries. Caries prevalence was greater in children who ate sugar more than twice a day (66.7% vs. 33.3%). The "none" group (n < 5) was removed from statistical analysis due to low cell counts. We found a significant (P < 0.001) dose-response connection between excess sugar consumption and caries prevalence. Table 5 compares teeth brushing frequency to dental caries. In youngsters who never cleaned their teeth, 66% had caries and 34% did not. 38.8% of daily-brushing children had caries, whereas 61.2% did not. With 22.9% caries prevalence and 77.1% caries-free, children who brushed twice daily had the lowest rates. Greater brushing frequency was associated with considerably decreased caries prevalence (P < 0.001).

Discussion

Prevalence of dental caries and related factors among children in Basra was 47%, which is lower than the prevalence of ECC in India but higher than in China [12] and Libya [13]. This shows that dental decay is an important oral health concern among the young people in Basrah. However, age groups, diagnostic criteria, food and fluoride exposure may influence the study outcome. The prevalence of decay was somewhat lower in females compared to males, but the difference was not significant. This is consistent with recent epidemiological studies which demonstrated boys and girls did not differ significantly in teeth caries. It is not sex that is the main cause of dental cavities, but behavior and environment [2]. In this study we observed a strong correlation between the prevalence of teeth caries and age (P < 0.001). The greatest prevalence was between 6–8 years. The higher prevalence of caries in children 6-8 years of age may be due to the transitional stage of mixed dentition when newly erupted permanent teeth, especially first permanent molars, are extremely vulnerable to caries. Newly formed permanent teeth are more prone to acids because of the lower mineralization and the porosity of the enamel of early erupted dentitions [14]. The decreased incidence in the 9-12 age group could be attributed to the natural exfoliation of the primary teeth, better dental care, and maturity of the older children. There was a strong correlation between parental education and the frequency of caries. The caries rate was 60% greatest among children whose parents' education levels were not reported. Parents with bachelor's degrees were associated with reduced frequency of caries in their offspring. This unexpected result could be a result of the intricate web of connections between parental instruction, understanding of oral health, and health behaviors. Not brushing may increase the risk of cavities in children. Mechanical

removal of plaque decreases dental caries. Fluoride toothpaste strengthens enamel and decreases bacterial biofilm when used twice daily [15,16]. Several elements, including bacteria, hosts, food, and time, contribute to the complexity of dental caries. So, cleaning your teeth is not enough to keep cavities at bay [17]. The research discovered a correlation between diet and tooth decay, namely sugar intake. More recent data have linked free sugar intake to a heightened susceptibility to tooth cavities, which is consistent with the observation that children who consume sugar have a higher prevalence of caries. [18,19]. Basic preventive dental programs should include counselling on sugar consumption for children and their parents.

Conclusion

This study showed that approximately fifty percent of children aged 3-12 years in Basrah, Iraq had dental caries. Dental caries was linked to factors such as age, how often one brushes their teeth, sugar intake, and parental education, rather than gender or socioeconomic position. Taking precautions at a young age is crucial, as 64% of children between the ages of 6 and 8 have mixed dentition. The findings of this study can be a basis for specific programs for improving oral health in Basra and other cities fo Iraq.

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Table 1. Distribution of caries by sex.

Sex	Status	With caries no	With caries	Total	P-value
Male	Count	55	60	115	0.146
	%	47.8%	52.2%	100%	
Female	Count	67	48	115	
	%	58.3%	41.7%	100%	
Total	Count	122	108	230	
	% of Total	53%	47%	100%	

Table 2. Distribution of caries by age group.

Age Group	Status	With caries no	With caries	Total	P-value
3–5 years	Count	23	25	48	<0.001
	% within Age Group	47.9%	52.1%	100%	
6–8 years	Count	36	64	100	
	%	36.0%	64.0%	100%	
9–12 years	Count	63	19	82	
	%	76.8%	23.2%	100%	
Total	Count	122	108	230	
	% of Total	53%	47%	100%	

Table 3. Distribution of caries by parent education level.

Parental Education Level	Count	With no caries	With caries	Total	P-value
Secondary School	60	35	25	60	0.027
	100%	58.3%	41.7%	100%	
Primary School	82	44	38	82	
	100%	53.7%	46.3%	100%	
University	63	33	30	63	
	100%	52.4%	47.6%	100%	
Not Specified	25	10	15	25	
	100%	40%	60%	100%	
Total	230	122	108	230	
	100%	53%	47%	100%	

Table 4. Distribution of caries by frequency of sugar consumption (excluded "None" category due to n < 5).

Sugar Consumption Frequency	Count	With no caries	With Caries	Total	P-value
Once	51	38	13	51	<0.001
	100%	74.5%	25.5%	100%	
Twice	79	50	29	79	
	100%	63.3%	36.7%	100%	
More than twice	96	32	64	96	
	100%	33.3%	66.7%	100%	
Total	226	120	106	226	
	100%	53.1%	46.9%	100%	

Table 5. Distribution of caries by brushing frequency.

Brushing Frequency	Status	With no caries	With caries	Total	P-value
Non	Count	33	64	97	<0.001
	%	34%	66%	100%	
Once	Count	52	33	85	
	%	61.2%	38.8%	100%	
Twice	Count	37	11	48	
	%	77.1%	22.9%	100%	
Total	Count	122	108	230	
	% of Total	53%	47%	100%	