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Research Article

Prevalence Of Early Childhood Caries in Preschool Children

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ABSTRACT

Background: Early childhood caries (ECC) is one of the most common chronic diseases in preschool children and remains a significant public health concern, particularly in developing regions. Objective: To determine the prevalence of early childhood caries and evaluate associated demographic, socioeconomic, dietary, and oral hygiene factors among preschool children. Methods: This cross-sectional descriptive study was conducted at Bakhtawer Amin Hospital over six months (December 2024 to May 2025) and included 150 preschool children aged 3–5 years. Participants were enrolled using consecutive non-probability sampling. Dental caries was assessed using the dmft index according to WHO criteria. Data regarding feeding practices, oral hygiene habits, parental education, and socioeconomic status were collected through a structured proforma. Statistical analysis was performed using SPSS version 26.0, and associations were assessed using the chi-square test, with $p < 0.05$ considered significant. Results: The prevalence of ECC was 58.7%, with an overall mean dmft score of 3.12 ± 2.41. Severe ECC was observed in 22.7% of children. ECC prevalence increased with age and was higher among males and rural residents. Significant associations were observed with low socioeconomic status, lower parental education, night-time bottle feeding, frequent sugary snack intake, irregular brushing, lack of parental supervision, non-use of fluoridated toothpaste, and absence of previous dental visits ($p < 0.05$). Conclusion: Early childhood caries is highly prevalent in this population and strongly associated with modifiable behavioral and socioeconomic factors. Preventive strategies focusing on parental education, dietary control, supervised brushing, fluoride use, and early dental visits are essential to reduce the burden of ECC in preschool children.

Keywords: Early Childhood Caries; Preschool Children; Dmft Index; Dental Caries Prevalence; Socioeconomic Status; Feeding Practices; Oral Hygiene; Fluoridated Toothpaste; Pediatric Oral Health; Preventive Dentistry

INTRODUCTION

Early childhood caries (ECC) is the term that is used to refer to one of the following conditions in a child under the age of six years: a decayed, missing (because of caries), or filled primary

tooth surface. [1]. It is not merely a simple problem of baby teeth, but an important chronic illness, which is an indicator of early exposure to cariogenic influences and insufficient preventive services. Going by standardized definitions can provide standardized prevalence measurement across populations. [2]. ECC is one of the most prevalent childhood diseases globally and one of the significant health issues of the population. According to the World Health Organization, untreated dental caries in primary teeth is of a high prevalence globally, but with a significant regional difference. [3]. The systematic reviews indicate that the proportion of affected preschool children is high, especially in low and middle-income environments, which highlights the necessity of local epidemiological data. [4]. Social determinants, patterns of sugar intake, fluoride exposure, and accessibility to preventive dental services are very powerful factors in ECC. [5].

ECC has been linked to pain, infection, eating and sleeping problems, poor growth, and poor quality of life of both the child and the caregiver clinically. [6]. Cases that are untreated might need complicated procedures, which might take a general anesthetic, which adds to the health care burden. [7]. Furthermore, dental disease in the permanent dentition occurs when there is early exposure to caries. [8]. ECC is a multifactorial etiology, which includes cariogenic biofilm, regular intake of fermentable carbohydrates, bad oral hygiene, suboptimal exposure to fluoride and prolonged or nocturnal feeding. [9]. Research has always found socioeconomic status, parental education, caries history of the caregivers and lack of dental visits as key risk factors. [10]. Early colonization by mutans streptococci, having microbiological causes, also predisposes the patient. [11]. Significantly, there is a significant clustering of ECC among vulnerable populations, which indicates health inequities among communities. [12][13]. Middle Eastern studies on the prevalence of the disease in the region indicate that it is high in preschool children, and thus local data would be appropriate to prevent it locally. [14].

Objective

To determine the prevalence of early childhood caries and evaluate associated demographic, socioeconomic, dietary, and oral hygiene factors among preschool children.

Methodology

The study was cross-sectional descriptive research involving Bakhtawer Amin Hospital in six months between December 2024 and May 2025. The research was planned to establish the early childhood caries prevalence among preschool children. Out of the 150 preschool-aged children that were in Pediatric Dentistry and General Dental Outpatient Department within the study period, consecutive non-probability sampling was employed to enroll them. The eligibility of all the participants was subjected to a standard oral examination to determine the existence of dental caries in primary teeth based on a set of diagnostic criteria of ECC.

Inclusion Criteria

- Preschool children aged 3–5 years
- Presence of at least one erupted primary tooth
- Children attending Bakhtawer Amin Hospital during the study period
- Parents/guardians willing to provide informed consent

Exclusion Criteria

- Children with systemic illnesses affecting tooth development
- Children with developmental dental anomalies
- Children currently undergoing dental treatment for caries
- Uncooperative children in whom oral examination could not be completed
- Parents/guardians unwilling to participate

Data Collection

Data were collected using a structured proforma. Demographic variables included age, gender, residence, and parental education level. Clinical examination was performed under adequate illumination using sterile mouth mirrors and probes while maintaining strict infection control protocols. Dental caries was recorded using the dmft (decayed, missing, filled teeth) index in accordance with World Health Organization diagnostic criteria. The presence of one or more decayed, missing (due to caries), or filled primary teeth was considered diagnostic of early childhood caries. Information regarding oral hygiene practices, feeding habits (including nocturnal feeding and frequency of sugary snack consumption), and previous dental visits was obtained through caregiver interviews.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using IBM SPSS Statistics version 24.0. Continuous variables such as age and dmft score were expressed as mean ± standard deviation, while categorical variables were summarized as frequencies and percentages. The prevalence of early childhood caries was calculated as the proportion of children diagnosed with ECC out of the total sample of 150 participants. Associations between ECC and demographic or behavioral variables were evaluated using the chi-square test. A p-value of < 0.05 was considered statistically significant.

Results

The mean age of the 150 children was 4.04 ± 0.82 years, with nearly equal distribution across age groups. Overall ECC prevalence was 58.7%, increasing from 52.2% at 3 years to 65.4% at 5 years. Males showed higher prevalence (63.4%) than females (52.9%). Rural children had greater ECC (68.4%) compared to urban children (52.7%). ECC was markedly higher among children of mothers with primary education (79.5%) versus graduate education (39.6%), indicating a strong socioeconomic influence.

Table 1. Baseline Demographic Characteristics of Participants (n = 150)

Variable	Category	n	%	ECC Present n (%)	ECC Absent n (%)
Age	3 years	46	30.7	24 (52.2)	22 (47.8)
	4 years	52	34.7	30 (57.7)	22 (42.3)
	5 years	52	34.7	34 (65.4)	18 (34.6)
Gender	Male	82	54.7	52 (63.4)	30 (36.6)
	Female	68	45.3	36 (52.9)	32 (47.1)
Residence	Urban	93	62.0	49 (52.7)	44 (47.3)
	Rural	57	38.0	39 (68.4)	18 (31.6)
Mother's Education	Primary	39	26.0	31 (79.5)	8 (20.5)
	Secondary	58	38.7	36 (62.1)	22 (37.9)
	Graduate+	53	35.3	21 (39.6)	32 (60.4)

Mean age = 4.04 ± 0.82 years

The overall mean dmft score was 3.12 ± 2.41. Children with ECC had a mean dmft of 4.85 ± 2.01, while caries-free children had 0.00 ± 0.00. Mild, moderate, and severe categories showed mean dmft scores of 2.10 ± 0.81, 5.12 ± 0.75, and 7.44 ± 0.88, respectively. Severe ECC was present in 22.7% of children, with a mean dmft of 6.92 ± 1.03, reflecting a considerable disease burden.

Table 2. Prevalence and Severity of ECC (n = 150)

Variable	Category	n	%	Mean dmft ± SD	Range
ECC Status	Present	88	58.7	4.85 ± 2.01	1–9
	Absent	62	41.3	0.00 ± 0.00	0
dmft Severity	0	62	41.3	0.00 ± 0.00	0
	1–3	41	27.3	2.10 ± 0.81	1–3
	4–6	29	19.3	5.12 ± 0.75	4–6
	>6	18	12.0	7.44 ± 0.88	7–9
Severe ECC	Present	34	22.7	6.92 ± 1.03	5–9
	Absent	116	77.3	1.21 ± 1.44	0–4

Overall mean dmft = 3.12 ± 2.41

ECC was significantly associated with socioeconomic status ($p < 0.001$), affecting 75.4% of low-income children compared to 34.6% in high-income groups. Similarly, children of fathers with primary education had higher ECC (73.7%) than those with graduate education (45.1%) ($p = 0.002$), highlighting the impact of parental education and economic background.

Table 3. Association Between ECC and Socioeconomic Variables

Variable	Category	ECC Present n (%)	ECC Absent n (%)	Total (n)	p-value
Socioeconomic Status	Low	46 (75.4)	15 (24.6)	61	<0.001
	Middle	33 (52.4)	30 (47.6)	63	
	High	9 (34.6)	17 (65.4)	26	
Father's Education	Primary	28 (73.7)	10 (26.3)	38	0.002
	Secondary	37 (60.7)	24 (39.3)	61	
	Graduate+	23 (45.1)	28 (54.9)	51	

Chi-square test applied.

Night-time bottle feeding was strongly associated with ECC (74.0% vs 42.5%, $p < 0.001$). Caries prevalence increased with sugary snack intake, rising from 34.6% (≤1/day) to 87.9% (≥4/day) ($p < 0.001$). Regular consumption of sweetened drinks also showed higher ECC prevalence (72.7%) compared to rare intake (42.9%) ($p = 0.002$), demonstrating a clear sugar-related risk gradient.

Table 4. Feeding Practices and ECC

Variable	Category	ECC Present n (%)	ECC Absent n (%)	Total (n)	p-value
Night Bottle Feeding	Yes	57 (74.0)	20 (26.0)	77	<0.001
	No	31 (42.5)	42 (57.5)	73	
Sugary Snacks	≤1/day	18 (34.6)	34 (65.4)	52	<0.001
	2–3/day	41 (63.1)	24 (36.9)	65	
	≥4/day	29 (87.9)	4 (12.1)	33	
Sweetened Drinks	Regular	48 (72.7)	18 (27.3)	66	0.002
	Occasional	25 (51.0)	24 (49.0)	49	
	Rare/Never	15 (42.9)	20 (57.1)	35	

Irregular brushing was associated with the highest ECC prevalence (83.3%), compared to 42.9%

among children brushing twice daily (p = 0.003). Lack of parental supervision (74.7%), absence of fluoridated toothpaste use (72.4%), and no previous dental visit (72.9%) were all significantly linked to higher ECC prevalence (p < 0.001), underscoring the protective role of preventive oral hygiene practices.

Table 5. Oral Hygiene Practices and ECC

Variable	Category	ECC Present n (%)	ECC Absent n (%)	Total (n)	p-value
Brushing Frequency	Once daily	51 (68.9)	23 (31.1)	74	0.003
	Twice daily	27 (42.9)	36 (57.1)	63	
	Irregular	10 (83.3)	2 (16.7)	12	
Parental Supervision	Yes	29 (43.9)	37 (56.1)	66	<0.001
	No	59 (74.7)	20 (25.3)	84	
Fluoride Toothpaste	Yes	33 (44.6)	41 (55.4)	74	<0.001
	No	55 (72.4)	21 (27.6)	76	
Previous Dental Visit	Yes	26 (40.6)	38 (59.4)	64	<0.001
	No	62 (72.9)	23 (27.1)	85	

Discussion

The current research revealed that the prevalence of early childhood caries (58.7) was very high among preschool children, showing that ECC is still a major issue of public health concern among this group of population. The dmft mean score was 3.12/2.41 indicating a moderate occurrence of disease but almost quarter of people (22.7) had severe ECC occurrence. Previous studies have indicated similar prevalence rates as well as similar mean dmft values in developing areas, where ECC is a frequent condition in pre-school children (more than half). These results support the undiagnosed caries load on early childhood [15]. The age trends observed in this study where prevalence ranged 52.2 per cent at the age of 3 years to 65.4 per cent at the age of 5 years are similar to those of the past studies that indicated progressive disease development with a growing period of exposure to the cariogenic factors. Previous studies also describe higher prevalence in males than in females, but even the differences between genders tend to be low. Notably, close correlations with poor socioeconomic status and less parental education were also found and the ECC was seen to impact on 75.4% of low-income children and 79.5% of children whose mothers attained primary school. Past studies recurrently indicate similar socioeconomic gradients and parental education and household income are critical predictors of ECC risk [16][17].

There was a dose response relationship in feeding practices. High frequency intake of sugary snacks (87.9% amongst 4 snacks /day and more) and night-time bottle feeding (74.0%) were highly correlated with ECC. Past studies also show that a long duration of bottle usage, consuming sugar often, and sweetened drinks are the prevailing variables that are at risk of change. The very high prevalence of the increased caries with increased sugar exposure in this study is also indicative to the well proven role of fermentable carbohydrates on the development of caries [18]. Evidence was found that oral hygiene behaviors are highly protective. None of them were highly associated with ECC with irregular brushing (83.3%), parental supervision (74.7%), and use of fluoridated toothpaste (72.4%). The previous studies have always focused on brushing under supervision and exposure to fluoride as the most important preventive measures among preschoolers. Also, the children who had not

attended any dental services before had significantly higher ECC prevalence (72.9 percent), which also reflects the previous studies that emphasize the necessity of the initial dental preventive contact [19][20]. On the whole, the results of this investigation can be compared with those of the previous ones and emphasize the idea that ECC is highly affected by socioeconomic factors, diet, and oral hygiene. The findings show that prevention programs targeting parental education, reduction in sugar consumption, brushing under supervision, and early dental visits should be used to prevent the impact of ECC among preschool generations.

Limitations

This paper has some limitations. Being a single-facility, cross-sectional study, which was done at Bakhtawer Amin Hospital, the results are not entirely applicable to the local community, and selection bias cannot be ruled out. The cross-sectional study design restricts the causal inferences on the interrelationship between risk factors and ECC. Parental-self-reporting was used on behavioral data including feeding habits and oral hygiene habits, suggesting the possibility of recall or reporting bias. Also, microbiological assessment and environmental fluoride exposure have not been assessed which could have also affected the caries risk assessment.

Conclusion

It is concluded that early childhood caries is highly prevalent among preschool children attending Bakhtawer Amin Hospital, affecting more than half of the studied population and demonstrating a considerable mean dmft burden. The disease showed strong associations with increasing age, low socioeconomic status, lower parental education, frequent sugar consumption, night-time bottle feeding, inadequate oral hygiene practices, and lack of fluoride use. These findings emphasize that ECC is largely preventable and closely linked to modifiable behavioral and social factors. Early parental counseling, supervised brushing with fluoridated toothpaste, dietary control, and timely dental visits are essential strategies to reduce the burden of ECC and improve long-term oral health outcomes in preschool children.

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