

Caries Prevalence, Oral Health Knowledge, and Treatment Needs among 6–12-year-old School Going Children of East Delhi: A Cross-sectional Study

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ABSTRACT

Aim: To assess the caries prevalence, oral health knowledge, and treatment needs among 6–12-year-old school-going children of the East Delhi region.

Materials and methods: A total of 700 enrolled school-going children, of both genders, between the age of 6–12 years, recruited from schools of East Delhi were assessed. After a clinical examination of each child, a single examiner performed the World Health Organization Oral Health Assessment Proforma 2013. There were a series of questions addressing oral health knowledge that were prepared and carefully phrased into a questionnaire form.

Results: Out of 700 children, 381 were male and 319 were female. The prevalence of caries in 6–12-year-old school-going children was observed to be 59.71%. Groupwise prevalence of caries was 57.14% in group I, 62.45% in group II, and 59.07% in group III. Overall mean decayed, missing, filled surfaces \pm standard deviation (dmfs \pm SD) and mean decayed, missing, and filled surfaces (DMFS) \pm SD were 3.50 ± 5.333 and 0.25 ± 1.102 , respectively. Approximately 60% of the study population required dental treatment.

Conclusion: Oral health education programs have been proven to increase knowledge and have been known to positively influence self-reported oral health-related attitudes and behavior as well as clinical parameters of oral health, including oral hygiene, gingival health, and dental caries. Overall, awareness regarding the importance of oral health and the necessity for early intervention can make a significant difference in improving the oral health status of society.

Clinical significance: Dental caries greatly impact people regardless of their gender, age, color, ethnicity, or socioeconomic status. Despite significant scientific advancement and the fact that caries are preventable, the condition remains to be a serious threat to public health, predominantly impacting young children. Knowledge of dental health and caries status is important for formulating appropriate preventive strategies, predicting usage trends and effective planning is essential for the improvement of oral health.

Keywords: Decayed, missing, and filled teeth, Dental caries, Dental education, Oral health Knowledge, School going children.

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INTRODUCTION

Oral health is a crucial facet of overall health and well-being, and it has an influence on numerous facets of a person's health status and quality of life, such as self-esteem, learning, employment, the ability to masticate and communicate, as well as other levels of daily activities.¹ Dental caries is the most prevalent debilitating disease affecting people worldwide among oral diseases.²

Despite significant scientific advancement and the fact that caries are preventable, the condition remains to be a serious threat to public health, predominantly impacting young children. Dental caries has been predominantly one of the reasons contributing to children's absences from school to decreased productivity and working hours.³ Information on epidemiological data of dental caries is a crucial prerequisite for updating our knowledge on the disease's shifting patterns, its treatment needs, and approaches to prevent its development, restrict the progression, and mitigate its consequences.⁴ Contrary to developed countries, underdeveloped and developing countries have seen rising rates of dental caries in children and adolescents over the past 20 years. A community-focused preventive program needs to be emphasized to overcome the high prevalence of dental caries in developing nations. Oral health education is a crucial component of these programs. It is believed to be a cost-effective strategy for promoting oral health, especially in schools, where all children can be reached out to,

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irrespective of their socioeconomic status or ethnicity.⁵ For the prevention of dental disease in school children, anticipating utilization patterns, and arranging and financing dental resources in an efficient way, an understanding of their dental health and treatment needs is imperative.⁶ The World Health Organization

(WHO) recommends school-based oral health promotion to improve knowledge, attitudes, and behavior related to oral health and to prevent and control dental diseases in children.⁷ No structured data, as per current research, providing complete information about caries prevalence, oral health knowledge, and treatment needs was available for East Delhi school children. The National Oral Health Survey and Fluoride Mapping—2003 reported that 72.5% of 12-year-old children. Since it is the most common oral disease with high prevalence among children, it is important to control the disease process by providing treatment and by increasing awareness regarding its preventive measures. Knowledge of dental health and treatment needs of school children is important for developing appropriate preventive approaches, anticipating utilization patterns, and planning effectively for the organization and financing of dental resources.³ The information obtained from the present study will serve as a baseline and contribute to the planning of oral health services and programs and oral health policies for school children. Hence, oral health education, which plays a key role in setting up a healthy society in terms of oral health, can be provided at the school level only. Imparting good knowledge at the school level will not only add to individual benefit but has the ability to bring change in society. Therefore, the current study was done to assess caries prevalence, oral health knowledge, and treatment needs among 6–12-year-old school-going children of East Delhi.

MATERIALS AND METHODS

Study Design

A cross-sectional study was conducted during the period from November 2015 to April 2018 in various schools in East Delhi in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines. A total of 700 children in the 6–12 age group attending schools in East Delhi were included in the study.

Sample Size Calculation

Based on previous Indian studies, the prevalence rate of dental caries varies from 45 to 55%. Considering a 50% expected prevalence and by taking +4 and -4% absolute precision on either side with a 95% confidence level, a sample size of 597 children was sufficient. Adding 10% absentees and nonconsent, the sample size increased to 664. Henceforth, it was decided to take 700 children as the sample size of the study.

Ethical Clearance and Informed Consent

Ethical clearance was obtained from the Institutional Ethical Committee of the University College of Medical Sciences and Guru Teg Bahadur Hospital, Delhi, India (IEC-HR 2015-98-23). Written informed consent was obtained from all parents/guardians of each child. Moreover, written consent and permission were also obtained from the respective schools. The purpose and nature of the study were explained to the parents and the respective principals and heads of all the schools.

Sampling and Randomization

The study population was determined using two-stage sampling techniques, and schools in the East Delhi region were listed. A total of 10 representative schools were chosen at random from a list of schools in the area in the first stage, and in the second stage, 70 students in the age range of 6–12 were chosen at random from each of the 10 schools, for a total sample size of 700 students, using a computer-generated

random number table based on the number of students enrolled. Out of 10 schools, six were private, and four were government schools.

Clinical Examination and Questionnaire

With the help of a mouth mirror and explorer, the solitary examiner conducted the intraoral examination of the children on the school premises. For each child, a WHO Oral Health Assessment Performa 2013⁸ was filled out, which includes the basic information, decayed, missing, filled surface (DMFS/dmfs), dental erosion, dental trauma, oral mucosal lesions, and enamel fluorosis indices. A questionnaire was employed in order to conduct one-on-one interviews with the children in a room on the school's premises to assess their knowledge of oral health. Students were then clinically examined on the school premises using a halogen light source, and caries status was measured by the DMFS index for permanent teeth and dmfs index for deciduous teeth, given by WHO, Oral Health Surveys, Basic Method (2013).⁸ A series of questions on oral health knowledge was constructed and carefully phrased in the form of a questionnaire, which included a series of questions regarding the chronological age of a child, feeding habits, and oral health knowledge. The questionnaire comprising seven questions, analyzed their knowledge of their dental-related problems, which were also either dichotomous (yes/no) or multiple-choice questions. The treatment needs of every child were evaluated and ascertained after being discussed with a dental expert in that particular field. Following the questionnaire, it was given to the children, which were examined and filled out by them under the guidance of their teacher. After the interview and clinical examination, simple oral hygiene instructions were given, such as mouth rinsing with water after each meal and a demonstration of proper brushing technique. WHO guidelines were approved as the diagnostic standards for dental caries, defining a carious tooth as one with a cavity on the surface of the dentine.⁷

For ease of analysis, 6–12-year-old children were divided into three groups:

- Group I: 6–8 years.
- Group II: 8–10 years.
- Group III: 10–12 years.

Data Analysis

All the collected data were analyzed using Statistical Package for the Social Sciences (SPSS) version 19 (IBM SPSS statistics). The prevalence of caries in males, females, and the total, with their 95% confidence interval, was determined. To compare qualitative data and determine statistical significance, a Chi-squared test was used. An unpaired student *t*-test was used to compare the DMFS/dmfs score between males and females.

RESULTS

Table 1 shows that out of 700 children, 381 were male and 319 were female. Table 2 shows the prevalence of caries in 6–12-year-old

Table 1: Profile of the study population

Group	Male n (%)	Female n (%)	No of children n (%)
Group I	117 (55.71)	93 (44.29)	210 (100)
Group II	140 (55.34)	113 (44.66)	253 (100)
Group III	124 (52.33)	113 (47.67)	237 (100)
Total number of children	381 (54.43)	319 (45.57)	700 (100)

Dental Caries in School Going Children

Table 2: Prevalence of caries in 6–12-year-old children.

Group	Number of children	Caries present	Prevalence (%)	p-value
Group I	210	120	57.14	0.001*
Group II	253	158	62.45	
Group III	237	140	59.07	
Total	700	418	59.71	

*p-value <0.05 is statistically significant; **p-value <0.001 is statistically highly significant

Table 4: Mean total caries (mean ± SD) score in 6–12-year-old children (gender-wise)

Gender	Mean total caries (mean dmfs + mean DMFS) ± SD	t	df	p-value
Male	3.92 ± 5.529	0.927	698	0.354
Female	3.54 ± 5.239			

*p-value <0.05 is statistically significant; **p-value <0.001 is statistically highly significant

Table 3: Mean caries score in 6–12-year-old children examined in the study

Group	Mean dmfs ± SD	Mean DMFS ± SD	Total caries ± SD (mean dmfs + mean DMFS)	p-value
Group I	3.83 ± 6.504	0.01 ± 0.119	3.85 ± 6.497	0.001*
Group II	4.23 ± 5.503	0.25 ± 1.418	4.47 ± 5.639	
Group III	2.43 ± 3.552	0.46 ± 1.159	2.88 ± 3.696	
Total	3.50 ± 5.333	0.25 ± 1.102	3.74 ± 5.398	

*p-value <0.05 is statistically significant; **p-value <0.001 is statistically highly significant

Table 5: Oral health knowledge of children

S. no.	Question	Options	Participants	p-value
1	Where do you get information regarding oral health?	Friends	16 (2.28)	0.003*
		Relatives	94 (13.42)	
		Teachers	96 (13.71)	
		TV and radio	32 (4.57)	
		Dentist	462 (66.00)	
2	Tooth decay can make me look bad	Yes	542(77.35)	0.83
		No	158 (22.65)	
3	Keeping natural teeth is not that important	Yes	496 (70.85)	0.08
		No	204 (29.15)	
4	I am afraid of going to a dentist because of possible pain	Yes	492 (70.28)	0.90
		No	208 (29.72)	
5	Regular visits to the dentist keep away dental problems	Yes	618 (88.28)	0.61
		No	82 (11.72)	
6	Brushing my teeth can prevent tooth decay and gum disease	Yes	568 (81.14)	0.30
		No	132 (18.86)	
7	Eating and drinking sweet things does not cause tooth decay	Yes	570 (81.42)	0.01*
		No	130 (18.58)	

*p-value <0.05 is statistically significant; **p-value <0.001 is statistically highly significant

school children examined in the study. Overall, caries were observed to be prevalent in 59.71% of cases. Groupwise prevalence of caries was 57.14% in group I, 62.45% in group II, and 59.07% in group III. Chi-squared test was applied, and an association between the group and caries was found to be highly significant (p -value = 0.001**).

Table 3 indicates the mean dmfs and DMFS. Overall mean dmfs ± standard deviation (SD) and mean DMFS ± SD were 3.50 ± 5.333 and 0.25 ± 1.102, respectively, whereas total caries (dmfs + DMFS) ± SD was 3.74 ± 5.398. In group I, mean dmfs ± SD and mean DMFS ± SD were 3.83 ± 6.504 and 0.01 ± 0.119, respectively, whereas total caries (dmfs + DMFS) ± SD was 3.85 ± 6.497. In group II, mean dmfs ± SD and mean DMFS ± SD were 4.23 ± 5.503 and 0.25 ± 1.418, respectively. Total caries count (dmfs + DMFS) ± SD was found to be 4.47 ± 5.639 in the present study. In group III, mean dmfs ± SD and mean DMFS ± SD were 2.43 ± 3.552 and 0.46 ± 1.159, respectively. Total caries (dmfs + DMFS) ± SD was 2.88 ± 3.696. Chi-squared test was applied, and an association between the group

and caries was found to be highly significant (p -value = 0.001**). Table 4 shows the association between gender and mean total caries (mean dmfs + mean DMFS) ±SD. When the statistical analysis was performed for the two means based on an independent sample t -test (student t -test), then it revealed a nonsignificant difference between both genders (p -value = 0.354). Table 5 depicts that 66% primarily acquired their knowledge about oral health from dentist professionals. Keeping one's natural teeth was significant at 70.85%. About 76.57% of children believed that having decayed teeth made them appear awful. While 81.42% of children recognized that consuming sweets promotes tooth decay, 81.14% of children stated: "brushing reduces tooth decay and gum disease." For fear of discomfort or pain, 70.28% of respondents reported they were reluctant to visit the dentist, and 88.28% reported that visiting the dentist every 6 months helps to prevent oral health problems. Because of the prospect of discomfort/pain, 70.28% of respondents reported being apprehensive about visiting the dentist, and 88.28%

Table 6: Treatment needs (group-wise) in the study population

Group	Total	Preventive care n (%)	One surface filling n (%)	Two surface filling n (%)	Pulp therapy n (%)	Crowns n (%)	Extractions n (%)
Group I	210	120 (57.14)	88 (41.90)	57 (27.14)	32 (15.23)	30 (14.28)	16 (7.61)
Group II	253	158 (62.45)	97 (38.33)	93 (36.75)	66 (26.08)	68 (26.87)	31 (12.25)
Group III	237	140 (59.07)	67 (28.27)	58 (24.47)	30 (12.65)	34 (14.34)	44 (18.56)
Total	700	418 (59.71)	252 (36)	208 (29.71)	128 (18.28)	132 (18.85)	91 (13)

reported that visiting the dentist every 6 months helps to prevent oral health issues. Table 6 depicts treatment needs groups in the study population. Approximately 60% of the study population required dental treatment. Out of the 700 children examined, 252 (36%) needed one surface filling, 208 (29.71%) required two or more surface fillings, and 91 (13%) needed extraction. Preventive care (like scaling, topical fluoride application, and diet counseling) was needed in 418 children (59.71%). The need for crown placement (18.85%) and pulp therapy (18.28%) was minimal. Hence, caries prevalence was found to be 59.71%, caries was found to be slightly higher in males, and more than half of the study population needed dental treatment.

DISCUSSION

Globally, the distribution of oral illnesses has undergone tremendous change during the last few decades. Most developed nations have historically had high rates of dental caries while developing nations have had reduced caries levels.⁹ During recent decades, in the majority of developing nations, oral problems, including dental caries, have risen and continue to be a serious issue.¹⁰ The occurrence of dental caries is frequently thought to be affected by changes in living conditions brought on by urbanization and the adoption of Western lifestyles in emerging nations.

Oral health education programs have been proven to increase knowledge and have been known to positively influence self-reported oral health-related attitudes and behavior as well as clinical parameters of oral health, including oral hygiene, gingival health, and dental caries.¹¹ These implications include the maintenance of better oral health over the long run as well as the retention of favorable oral health-related behaviors in the short term.¹² To accomplish oral health promotion, schools provide the ideal setting for oral health education to be delivered with preventive care. It is well-acknowledged that schools are the appropriate environment for effectively delivering preventive care and education about oral health.¹³ The present study was undertaken in the various schools of East Delhi to determine the caries prevalence, oral health knowledge, and treatment needs in 6–12-year-old school-going children.

The caries prevalence was found to be 59.71% in the present study. This finding was similar to the studies done by Prabakar et al.¹⁴ (47.3%) in Chandigarh, Sharma et al.⁶ (58.4%) in Kangra district, and Prasad et al.¹⁵ (63.5%) in various schools of West Godavari district. Compared to studies conducted by Grewal et al.¹⁶ in Delhi, this study population had a higher prevalence of caries. Grewal et al.¹⁶ in Delhi and Dhar et al.¹⁷ in Udaipur district reported a prevalence of 52.3 and 46.75%, respectively. The prevalence of caries in this study was slightly high than the findings of the National Oral Health Survey 2002–2003, India¹⁸ (50% in 5-year-old and 52.5% in 12-year-old children). This may be due to the differences in case definitions and criteria. The prevalence in the present study was less in comparison to the study done by Jain et al.¹⁹ (82.62%) in Bundelkhand and Shingare et al.²⁰ (80.92%) in Uran, Raigad district.

It may be due to the variation in several sociodemographic factors and geographical location.

The mean caries (DMFS + dmfs) \pm SD of all children examined in the study was 3.74 ± 5.398 , which is similar to the study done by Dash et al.²¹ (3.81 ± 4.91) in Cuttack. The mean decayed, missing, filled teeth (DMFT) in the National Oral Health Survey 2002–2003, India¹⁸ in 5-year-old children was 1.9, whereas in 12-year-old children, it was 1.7. Although DMFT and DMFS/dmfs cannot be compared, from this, it can be interpreted that there was a higher severity. Mean total caries was slightly higher in males than females, although the finding was statistically not significant.

Similar to the findings of Priya et al.²² (74.5%) and Al-Omiri et al.²³ (77%), 76.57% of children in the present study were conscious that tooth decay could impact their appearance. Regarding the source of information about oral health, 66% of children received information from dentists, followed by teachers (13.71%) and relatives (13.42%). The majority of children (88.28%) agreed that visiting the dentist regularly prevents dental problems. Similar outcomes were identified by Mehta et al. (83.2%),²⁴ although Blaggana et al. (77.6%)²⁵ and Priya et al. (71.60%)²¹ reported significantly lower results. The vast majority of children (81.14%) were aware that brushing their teeth can prevent tooth decay and gum disease, which is corroborated by the studies performed by Goutam et al. (80.72%)²⁶ and Harikiran et al. (75.1%).²⁶ In comparison to the study conducted by Harikiran et al. (67.8%),²⁷ present studies showed a higher number of children (70.28%) expressed fear of visiting the dentist due to potential discomfort/pain.

In this study, it was shown that a significant percentage of children (62.56%) experienced dental pain in the previous 12 months. Whereas, Harikiran et al.²⁷ reported (59.7%) dental pain in 11- to 12-year-old school children of Bengaluru. In comparison to the study conducted in Bengaluru, as reported by Harikiran et al.²⁷ (35.1%), the children in the present study had 47.14% higher dental appointments. In the current study, it was observed that a large percentage of the study group (70.28%) had a fear of acquiring dental treatment, whereas Mehta et al.²⁴ and Harikiran et al.²⁷ revealed that fear prevalence was 15.5 and 46.1%, respectively in their studies. In contrast with previous studies, merely one out of 700 children skipped school due to dental pain, which is relatively very low compared to other studies. Dash et al. in 2002 showed higher occurrences than the present study.²¹ Children were accompanied by either of their parents or both to visit the dentist.

In the present study, it was assessed that around 60% of the total children examined required dental treatment. It was comparable to the study done by Moses et al.²⁸ (62.83%) in Chidambaram; one surface filling was required maximum in the age group I (6–8 years)—41.9% as compared to group II (8–10 years)—38.3%, and group III (10–12 years)—28.3% which is statistically significant. This is comparable to the study done by Peedikayil et al.,²⁹ in which 5–7-year-old children required a maximum of one surface filling. In the study done by Dhar et al.¹⁷ in Udaipur, the trend was the opposite; that is, the requirement of one surface filling increased with age. Two surface fillings, pulp therapy, and crowns

were required maximum in group II (8–10 years) as compared to group I (6–8 years) and group III (10–12 years). The reason for more treatment needs at 8–10 years of age compared to that of 6–8 years can be attributed to the fact that caries is a continuous and cumulative process. Extraction was required maximum in group III (10–12 years). Results were comparable to the results obtained by Peedikayil et al.²⁹

Although dental caries prevalence has decreased over the past decade, there are still inequalities in disease distribution.³⁰ According to a recent study, there is a rise in the prevalence of dental caries in deciduous dentition, and one out of every two children in India has dental caries.^{31,32} Compared to South Asians, Indians had a greater incidence of dental caries, and more girls than males experienced this issue, according to a recent publication that secondary analyzed the data presented in a publication in the *Lancet* in 2017.³³ Schools provide an ideal setting for providing oral health education at an early stage. However, education itself is insufficient to significantly improve oral health conditions.³¹ Health promotion and prevention play a very pivotal role in a country like India, where healthcare facilities are inaccessible and unaffordable to many regions of the country, including rural and remote areas. Schools are primarily the ideal settings for health promotion. Schools taken up for the study were either private or government located in the Urban area of Delhi. The improvement of school health can be rapidly accelerated with a basic prioritized action plan utilizing and employing proven methodologies and approaches, benefiting millions of school-going children. A probable limitation of the study could be that follow-up of knowledge imparted to students was done to study the impact of the education provided, and treatment was also not provided. Therefore, initiatives should be made to increase accessibility to fluorides, dental sealants, and other proven techniques for preventing caries, including dietary guidance and good oral hygiene recommendations. In addition, India has to set up a database that meets international standards for monitoring dental caries. Hence, future studies may be planned, which also include follow-up to evaluate the impact of education provided.

CONCLUSION

The prevalence of caries among 6–12-year-old school children in East Delhi was 59.71%, with Mean dmfs/DMFS in the study population of 3.74. Approximately 70% of children were afraid of the dentist because of possible pain. Almost 96% of children brushed their teeth regularly. Most of the children had basic oral health knowledge. Oral health education programs have been proven to increase knowledge and have been known to positively influence self-reported oral health-related attitudes and behavior as well as clinical parameters of oral health, including oral hygiene, gingival health, and dental caries. Overall, awareness regarding the importance of oral health and the necessity for early intervention can make a significant difference in improving the oral health status of society.

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