

Dental Caries in Relation to Socioeconomic Factors of 6 and 12-year-old Schoolchildren of Paonta Sahib, Himachal Pradesh, India: An Epidemiological Study

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ABSTRACT

Aims and objectives: Determination of prevalence of dental caries in 6 and 12-year-old schoolchildren, dental caries prevalence between government and private schoolchildren, and the influence of socioeconomic factors on dental caries on children of Paonta Sahib, Himachal Pradesh, India.

Materials and methods: In the government and private schools at Paonta Sahib of Sirmour district, Himachal Pradesh, India, a cross-sectional study was carried out. The study population comprised schoolchildren of 6 and 12 years. A total of 1,004 children of both genders were surveyed for dental caries status. The decayed, missing, filled teeth (DMFT) index was used for clinical examination of caries. Prior collection of sociodemographic information was done in addition to information on oral health behavior by personal interview.

Results: In the present study, dental caries prevalence was found to be higher in children of 6 years of age (63.6%) than that of 12 years (53.6%) ($p = 0.001$). The mean DMFT was 2.47 ± 2.75 for 6-year-old children and 1.18 ± 1.33 for 12-year-old children. No significant difference was observed in dental caries prevalence among children of government and private school ($p = 0.167$). Moreover, dental caries frequency was highest in children belonging to upper-middle (38.14%) class followed by lower-middle (32.32%), upper-lower (25.42%), and upper class (4.12%). The obtained data were analyzed using the chi-square test and one-way ANOVA test.

Conclusion: Dental caries prevalence was high in children of 6 years of age in the study. The dental caries frequency was more in upper-middle-class children. These results suggest that emphasis should be given to scientific monitoring, effective implementation, and evaluation of school-based oral health promotion and preventive programs to increase the dental awareness and oral hygiene practices, in Paonta Sahib, Sirmour district.

Keywords: Decayed, Dental caries, Filled teeth, Missing, Prevalence, School children.

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INTRODUCTION

The preservation of healthy teeth is one of the key health issues in childhood.¹ Most prevalent chronic disease in man worldwide is dental caries, which is multifactorial in nature and starts with shift in commensals of biofilm.² It is considered to be an important public health issue worldwide due to the pain and suffering caused to subjects, the high cost of its treatment, and the impact on the quality of life.³ Schoolchildren can experience pain from caries in primary as well as permanent teeth. Due to lack of awareness in parents, they think that once the deciduous tooth will exfoliate, the pain will disappear.⁴

Dental caries is still a smoldering disease in countries like India that has engulfed deep into regions where the means are inadequate for dental treatment and there is lack of public awareness and motivation with increased intake of carbohydrates.⁵

Prevalence of oral disease and formation of children's oral hygiene habits may be influenced by parental skills and their attitude toward oral hygiene.⁶ Parents who are more vigilant have lower caries risk in comparison to those who are reluctant to maintain the oral hygiene status of their children. General health is also affected by several oral diseases, as established by many studies. Throughout the world, millions of school and work hours have been lost each year due to oral diseases as they restrict activities at school, work, and home.⁷ Hence, the main purpose of this study was to determine dental caries prevalence of 6 and 12-year-old schoolchildren, dental caries prevalence between

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government and private schoolchildren, and the influence of socioeconomic factors on dental caries in children of Paonta Sahib, Himachal Pradesh, India.

MATERIALS AND METHODS

Study Design

A cross-sectional study was conducted to assess the relation in dental caries and socioeconomic factors in the schoolchildren of 6 and 12 years at Paonta Sahib, Himachal Pradesh.

Sampling

A list of schools in Paonta Sahib was obtained from the district education office. A multistage sampling procedure was adopted for the study. In the first stage, random sampling was done to select schools by the lottery method. Total 12 schools from different wards of Paonta Sahib were selected randomly out of which 7 were government and 5 were private schools, respectively. In the second stage, after selecting the schools, subjects with age group 6 and 12 years were selected and their age was confirmed from the school record.

Inclusion Criteria

- Children aged 6 and 12 years
- Children who are residents of Paonta Sahib
- Children studying at government or private schools at Paonta Sahib

Exclusion Criteria

- Children taking long-term medication for chronic disease
- Medically compromised children
- Children undergoing orthodontic treatment
- Children with physical or mental disabilities
- Children with developmental dental defects

Sample Size Calculation

The sample size was calculated on the basis of the pilot study, which was done on 50 cases. In the pilot study, dental caries was 70% among the population studied. Sample size was calculated as follows using the following formula:

$$\text{Sample size} = \frac{Z^2 \times (p) \times (1-p)}{c^2}$$

where,

Z = Z value (e.g., 1.96 for 95% confidence level)

p = expected prevalence of dental caries

For the present study, this was 70% and expressed as 0.7.

c = precision level

$$\text{So, sample size was} = \frac{(1.96)^2 \times (0.7) \times (0.3)}{(0.03)^2}$$

So, the sample size was estimated to be 896.

Taking into consideration 10–15% nonresponse and including the available children, we examined 1,004 children for our study.

Permission

From the district educational officer of Sirmour, an official permission was obtained. An Informed consent was obtained from the principals of various schools and parents of the children involved in this study.

Clinical Examination of Dental Caries

Standard infection control guidelines were applied. In the daylight away from direct sunlight, all the children were made to sit on ordinary chair and recordings were carried out.

Using a plane mouth mirror under natural light and a community periodontal index for treatment needs (CPITN) probe,

the oral examination was conducted in respective schools. The components of the decayed, missing, and filled teeth (DMFT) index have been defined as follows: D = tooth requiring treatment because of caries, lost or fractured filling; M = tooth missed because of caries; and F = filled tooth, no need of treatment. The World Health Organization (WHO) oral health assessment form 2013 was used to record dental caries.

Statistical Analysis

The statistical analysis was done using Statistical Package for Social Sciences (SPSS) version 21.0 and Epi Info version 3.0. The Chi-square test was used as a statistical test for difference between the proportions. At a probability value of 0.05 or less, significance of all statistical tests was predetermined.

RESULTS

Sample Distribution According to Age

Table 1 shows that out of total population of 1,004 children, 437 of them belonged to the age group of 6 years and 567 belong to the age group of 12 years.

Sample Distribution According to Age and Type of School

Table 2 shows that out of 1,004 children, 437 children belong to the 6-year age group out of which 113 attended government schools and 324 attended private schools and 567 children belong to the 12-year age group out of which 229 attended government schools and 338 attended private schools.

Sample Distribution According to Socioeconomic Status

Table 3 shows that out of 1,004 children, 231 children belong to the upper-lower class, 340 belong to the lower-middle class, 377 belong to the upper-middle class, and 56 belong to the upper class.

Prevalence of Decayed Teeth in 6 and 12-year-old Children

Figure 1 shows that out of 437 children of the 6-year age group, decayed teeth were present in 278 (63.6%) children. Of the 567 children of the 12-year age group, decayed teeth were present in

Table 1: Distribution of sample size according to age of children

Age	Number	Percentage
6 years	437	43.53
12 years	567	56.47

Table 2: Distribution of sample size according to age and type of school of children

Type of school	Age		Total
	6 years	12 years	
Government school	113	229	342
Private school	25.9%	40.4%	34.1%
	324	338	662
Total	74.1%	59.6%	65.9%
	437	567	1,004
	100.0%	100.0%	100.0%

Table 3: Distribution of sample size according to socioeconomic status

Socioeconomic status	Distribution	
	Number	(%)
Lower	0	0
Upper lower	231	23.0
Lower middle	340	33.86
Upper middle	377	37.55
Upper	56	5.59
Total	1004	100

Table 4: Prevalence of decayed teeth according to type of school

Type of school	Decayed teeth prevalence		
	Present	Absent	Total
Government school	188	154	342
	55.0%	45.0%	100.0%
Private school	394	268	662
	59.5%	40.5%	100.0%
Total	582	422	1,004
	58.0%	42.0%	100.0%

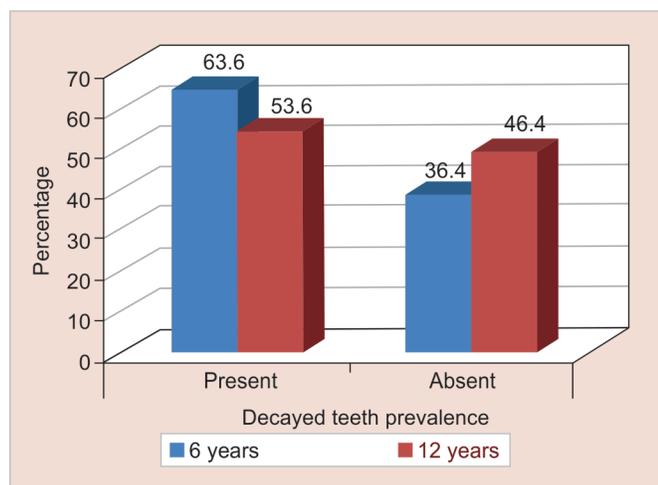


Fig. 1: Prevalence of decayed teeth in 6 and 12-year-old children

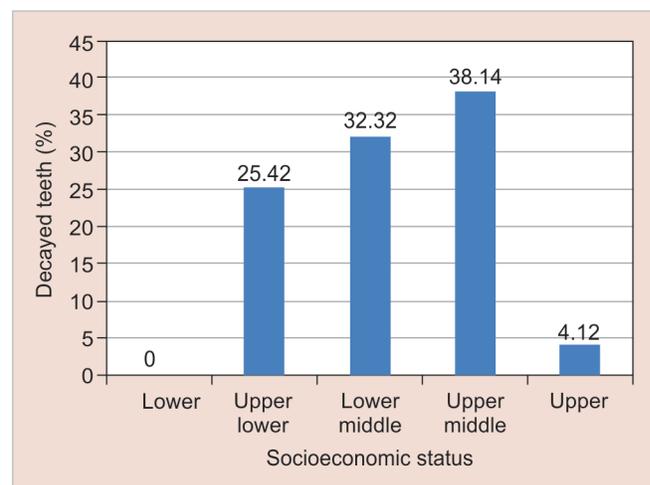


Fig. 2: Relationship between socioeconomic status and decayed teeth distribution in children

304 (53.6%) children and this difference was statistically significant ($p = 0.001$). Six-year-old children showed significantly ($p = 0.001$) higher mean number of decayed (D) teeth (2.36) as compared to 12-year-old children (1.06). The mean DMFT score was significantly ($p = 0.001$) more among 6-year-old children (2.47) as compared to 12-year-old children (1.18).

Prevalence of Decayed Teeth According to Type of School

Table 4 shows that of the 342 children attending government school, decayed teeth were present in 188 (55%) children and of the 662 children attending private school, decayed teeth were present in 394 (59.5%) children and the difference was statistically nonsignificant ($p = 0.167$). The mean number of decayed (D) teeth was significantly ($p = 0.002$) more among private schoolchildren (1.77) as compared to government schoolchildren (1.33). The mean DMFT score was significantly ($p = 0.003$) more among private school children (1.88) as compared to government schoolchildren (1.44).

Relationship between Socioeconomic Status and Decayed Teeth Distribution in Children

Figure 2 shows that out of 582 decayed teeth, 148 (25.4%) were present in children belonging to the upper-lower class, 188 (32.3%) belong to the lower-middle class, 222 (38.1%) belong to the upper-middle class, and 24 (4%) belong to the upper class. So, it was concluded that decayed teeth frequency was more among children who belong to the upper middle class followed by lower-middle class, upper-lower class, and upper class. The mean number of decayed (D) teeth was significantly ($p < 0.001$) more among the

children belonging to the lower-middle class (1.50) as compared to children belonging to the upper-middle or upper class (1.26/1.20). The mean DMFT score was significantly ($p < 0.001$) more among the children belonging to the lower-middle class (1.60) as compared to children belonging to the upper-middle or upper class (1.37/1.28).

DISCUSSION

Dental caries is still a major public health problem in many developing countries where it affects 60–90% of the schoolchildren, even though it has declined in many parts of the developed countries, and the vast majority of adults as updated by WHO on the basis of epidemiological information available in the databanks.⁷ In India, many epidemiological studies on children’s oral health have been carried out. Nevertheless, there are few studies that provide information on risk factors for dental caries in children pertaining to Himachal Pradesh.

The present study gave the correlation of prevalence of dental caries and socioeconomic factors among 6 and 12-year-old schoolchildren in Paonta Sahib, Himachal Pradesh.

In this study, dental caries prevalence was found to be 63.6% in 6-year-old children whereas it was 53.6% in 12-year-old children. The mean number of decayed teeth, DMFT score, and DMFS score were significantly more among 6-year-old children. A similar study was conducted by Mohiuddin et al.⁸ in Karachi city and found 74.9% caries prevalence in 6-year-old and 63% caries prevalence in 12-year-old children.

In the present study, dental caries prevalence was high in primary dentition (mean DMFT 2.47, 63.6%) when compared

with permanent dentition (mean DMFT 1.18, 53.6%). Difference in thickness of enamel in the deciduous and permanent teeth has been found to be one of the reasons behind the high caries in 6 years old. The enamel thickness in deciduous teeth is 1 mm, which is less when compared with permanent teeth where it is 2.5 mm. A set of factors such as a diet higher in sugars and/or the inability of a younger child to properly brush their teeth on their own combined with the thin enamel layer may cumulate the effect. Along with lack of preventive measures, the increased caries susceptibility in deciduous teeth is also triggered by lower calcium content of deciduous teeth and structural differences. Another reason could be that the recording of incipient caries by the WHO index is done only when the caries involves the dentin, hence, resulting in underestimation of caries in the 12-year age group.⁵ Primary schoolchildren are found to be at utmost need of dental services and dental health education. The reason may be due to the lack of oral healthcare access among schoolchildren, modification of lifestyles followed by increase accessibility to sugar-rich diet, and frequent intake of fizzy drinks with an increase in unmet treatment needs, in addition to poor oral hygiene practices and lack of appropriate dental health knowledge and supervision among those schoolchildren.⁸

In the present study, a nonsignificant difference was found in the prevalence of dental caries among government and private school-going children. The results of our study are in accordance with the study conducted by Mohiuddin et al.⁹ where no significant association was found in caries prevalence among children of government and private schools. Moreover, difference in mean DMFT score was also not significant among government and private schoolchildren. The results of our study are contradictory to the study conducted by Sofowora et al.⁹ in Nigeria in 2006 and Piovesan et al.¹⁰ in Brazil in 2011 where dental caries prevalence was more among private school-going children than public school-going children and this difference was statistically significant. Also, difference in mean DMFT score was statistically significant, which was higher for private school-going children.

The socioeconomic status of child's parents was studied on the basis scale given by Kuppuswamy. According to our study, caries frequency was more in the upper-middle class (38.14%) followed by the lower-middle class (32.32%). The result of our study are in accordance with the study conducted by Soares et al.,¹¹ which stated that children belonging to low socioeconomic status reported less incidence of dental caries as compared to mid to high socioeconomic status. This may be explained by larger disposable incomes in people belonging to high socioeconomic status, permitting the purchase of food with high sugar content. Large increase in sugar consumption has been found to be the reason for high dental caries experience in the children belonging to mid to high socioeconomic status. Low dental caries among

upper-class children is because of better oral hygiene, regular dental visits, oral health knowledge, and positive attitude toward availing oral healthcare services.¹¹

CONCLUSION

Dental caries prevalence was found to be higher in 6-year-old children in this study. The dental caries frequency was more in upper-middle-class children. These results suggests that emphasis should be given to scientific monitoring, effective implementation, and evaluation of school-based oral health promotion and preventive programs to increase the dental awareness and oral hygiene practices in Paonta Sahib, Sirmour district.

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