

Prevalence Of Dental Caries Among Primary School Students In Madurai City, Tamilnadu, India

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ABSTRACT

Aim: Dental caries is an important public health issue, influenced by various socio-demographic factors. The occurrence of carious teeth in school children is very much of concern as it will restrict their daily activities at the schools and homes instigating redundant loss of study, work and play hours. Therefore, the present study was aimed to determine the prevalence of dental caries among primary and middle school going children in Madurai city. **Materials & Methods:** For this study, an overall of 40 Corporation schools were randomly selected from the Madurai city. About 3380 children aged between 6-10 years were selected from these schools. Assessment of dental caries prevalence was performed using WHO Basic Oral Health Surveys – Oral Health Assessment Form for the Children (2013). Each child was examined in their respective school by dental surgeons. **Result:** Out of the 3380 school children that were examined, 1475 were boys and 1905 were girls. 43% school children had dental caries. Prevalence of dental caries was highest among the 10-year-old school students (22.70%) and the lowest in 6-year-olds (17.62%). The dominance of dental caries was higher in girls (55.21%) than boys (44.78). **Conclusion:** The overall prevalence of dental caries was 43% and it was higher in 10 years old when compared to other age groups. Increased prevalence suggests that further follow ups and likewise improving the awareness among teachers, parents and students are necessary too. Also, immediate oral health promotion strategies such as an increase in school dental health programmes are recommended.

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1. INTRODUCTION:

The well-being of an individual comprises of standard of living, level of living and the quality of life. And these components consecutively encompass the general and oral health as its essential measure.¹ Among the major public health problems in the world, oral diseases weigh a major share due to its high projection in every social class. The difficulties associated with oral disease are a serious burden on countries around the globe.² Dental caries is ranked as 3rd among all chronic non-communicable disease by World Health Organization (WHO), that entails consideration from around the world for its prevention and treatment.³

Occurrence of Dental caries has increased throughout the globe involving the people of all societies.⁴ The prevalence of dental caries in developing countries like India, is a social health burden, specially of childhood and is particularly magnified among the individuals between 1 – 17 years.^{5,6} Socio-demographic factors like age, gender, ethnicity, dietary patterns and oral hygiene habits influence the frequency morbidity indicators of the carious lesions of the teeth.⁷ The scientific literature from across India demonstrates an upsurge in the occurrence of dental caries among the school-going children.

School age is an persuasive stage in an individual's life, when sustainable health related behaviors, as well as beliefs and attitudes, are being developed.⁸The ideal age groups for motivating the school children to maintain the oral hygiene measures,would be 6-10 years.The children in this age are of utmost concern, because of their relation to caries prevalence in the primary dentition, which may exhibit changes over a shorter time span than in the permanent dentition at other index ages.²During the same period, the outcomes encountered due to presence of oral diseasesare found to have a foremost impact on theirdaily accomplishments and well-being. Moreover, dental caries will restrict their activities at the educational institutions and houses causing unnecessary loss of study, work and play hours every day of the year.⁹

Although several attempts have been undertaken by government and educational institutions to prevent, manage and treat the dental caries, its occurrence has been amplified over time, irrespective of the region or location of school or living.⁷ Since there is sparse data available regarding the frequency of dental caries in children from the Corporation schools in Madurai, this study would serve as a privileged information to focus on the normative need of this population. Therefore, this study is carried out to assess the prevalence of dental caries among Corporation primary and middle School studentsin Madurai,Tami Nadu,India.

Objectives of this study:

- To assess the prevalence of dental caries using WHO Oral Health Assessment for Children (2013)in the total study population
- To assess the prevalence of dental caries between various age groups (6 – 10 years) using WHO Oral Health Assessment for Children (2013)
- To assess the prevalence of dental caries between males and females using WHO Oral Health Assessment for Children (2013)
- To compare the relationship of dental caries between various age groups and gender.

2. MATERIALS &METHODS:

This observational descriptive cross-sectional study was conducted from March – April, 2019 to assess the prevalence of dental caries in children aged 6-10 years in corporation schools between classes I and 5.The children with parental consent (obtained through an official form), present on the day of examination, and without any major illness or systemic diseases were included in the study. Approval for screening of children was obtained from the Madurai corporation officials and concerned school authorities. Ethical clearance for carrying out this study was sought from the Institutional Review Board, APDC (Ethical Clearance Number - ???).

Using statistical power analysis G*Power software (3.1 version) and considering χ^2 tests: Goodness of fit tests – Contingency tables, α error as 0.05 at 95% CI, β error as 0.05, Power of the test (1- β error) as 95%, Degrees of freedom as 4 and Cohen's w effect size statistic as 0.0751 (*determined from Saravanan S J et. al; 2003*); the total sample size (n) for the current study was estimated to be 3302.⁶

Initially, 40 Schools was randomly selected (tossing coin method) from a list of 330 Corporation schools. Then, a total of 3380 children were randomly selected from 40 Corporation primary and secondary schools in Maduraicity limit through simple random sampling method using lottery method.A group of 36 dental surgeons carried out the examination on various days within the set study period (to assess large no. of students each day). Prior to beginning this study, these dental surgeons were trained and calibrated (assessment of carious lesions) for 5 consecutive days in a private clinic in Madurai using WHO Basic Oral Health Surveys (2013).² The inter-rater reliability between these 36 dental surgeons was analyzed by using intra-class correlation (ICC): two-way mixed effects model and absolute agreement definition, and the ICC value was found to be 0.955 (p = 0.000) indicating excellent reliability.

Dental screening was conducted in class rooms of the respective schools.The children were seated in ordinary chair, while the examiner was standing behind the child's head or side and the recording assistant was seated close to the examiner. The teeth were examined under natural light (if not, torch light) for caries with mouth mirror and CPI probe.²Adequate supply of sterile instruments were carried each day for the examination and also, an electric instrument sterilizer, container and solution for disinfection of instruments were carted along to the survey site.The Decayed component (carious teeth) were all the teeth with codes 1 or 2 in Dentition Status.² The data was recorded based on presence or absence of carious lesions alone. If at least one carious tooth (≥ 1) was present, then it was recorded as caries present, if not absent.

After the clinical examination, dental health education regarding anatomy of teeth, brushing habits and sugar intake through power point slides was given to the students and teachers of every school. The teachers motivated the children to get screened and referred for treatment. As to reinforce positive good oral habits, a tooth paste and tooth brush were also given to each child who were part of this massive survey. The children were then referred to the nearby private dental clinics to restore their carious teeth at a free of cost.

3. STATISTICAL ANALYSIS

Data regarding presence or absence of carious teeth were compiled in a Microsoft excel and analyzed using IBM SPSS Statistics, Version 20 (IBM Corp., Armonk, N.Y., USA). Data was investigated for normality using the Komolgorov-Smirnov test and observed a data deviated from the normal distribution. Descriptive statistics including frequency and percentage were derived. Chi-square test was used to observe the relationship between dental caries and other variables (age and gender). A p-value <0.05 was considered statistically significant.

4. RESULTS

Among the 3380 students assessed, 1475 students were boys and 1905 were girls. The distribution of sample population according to age and gender is given in (Table 1, Figure 1).

Table 1: Distribution of study population by age and gender

Age	Boys (n)	Girls (n)	Percentage (%)
6 years	279	340	18.31
7 years	286	340	18.52
8 years	330	390	21.30
9 years	267	385	19.28
10 years	313	450	22.57
Total (n = 3380)	1475	1905	100

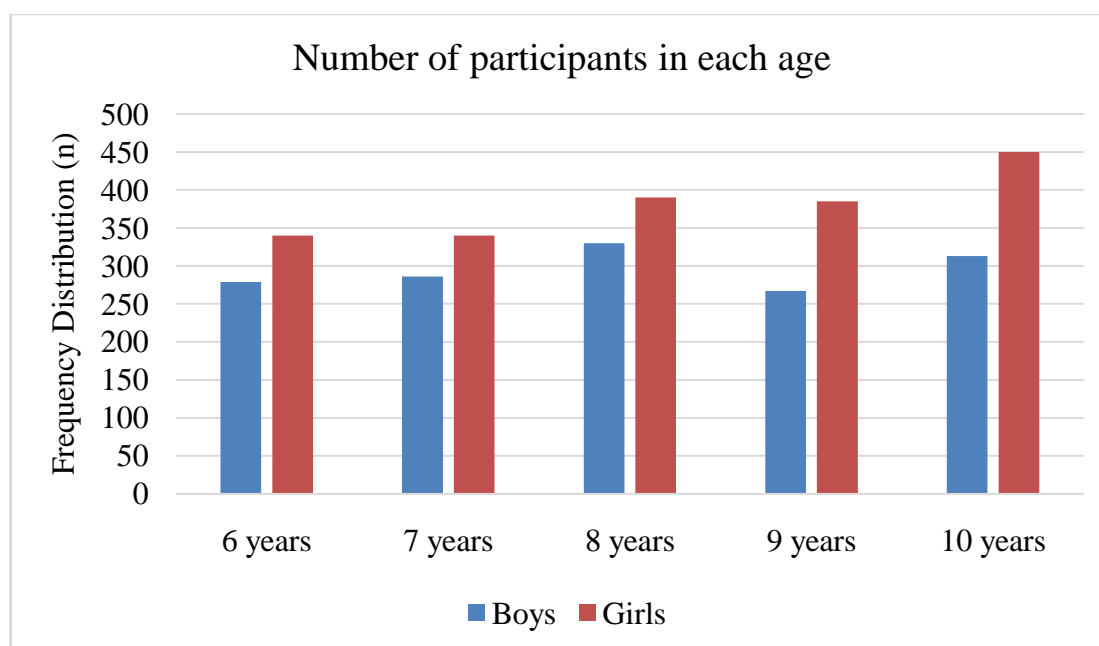


Figure 1: Age and gender distribution of participants

The overall prevalence of dental caries in the school students was found to be 43%. (Table 2, Figure 2).

Table 2: Prevalence of Dental caries among the study population

Total (n)	Total Non-Carious [n (%)]	Total Carious [n (%)]
3380	1922 (56.87)	1458 (43.13)

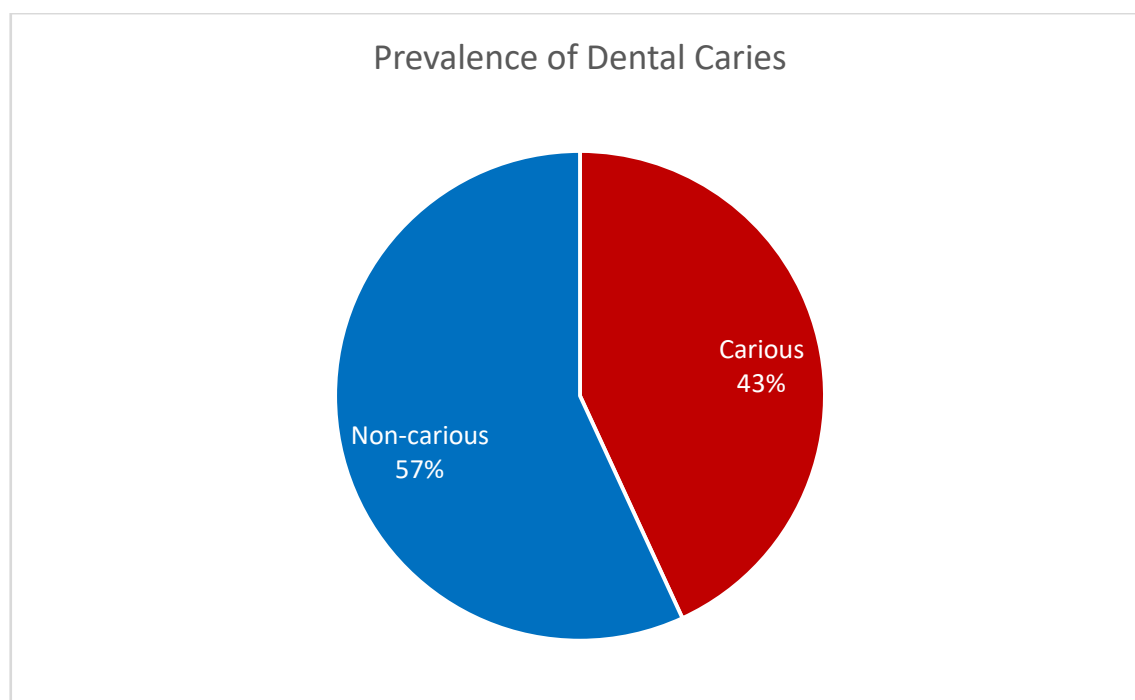


Figure 2: Prevalence of Dental caries in the total study population

Among the various age categories from 6 – 10 years old, the 10-year-old school students had the highest percentage of dental caries (22.70%) and the least was observed in 6-year-olds (17.62%) and this relationship between age groups and prevalence of dental caries was statistically not significant ($p=0.487$). [Table 3]

Table 3: Prevalence of Dental Caries based on age

Age	Prevalence of Dental Caries		Total	Chi-square test value	p-value
	Non carious [n (%)]	Cariou [n (%)]			
6 years	362 (18.8)	257 (17.6)	619 (18.3)	3.439	0.487 (NS)
7 years	338 (17.6)	288 (19.8)	626 (18.5)		
8 years	409 (21.3)	311 (21.3)	720 (21.3)		
9 years	381 (19.8)	271 (18.6)	652 (19.3)		
10 years	432 (22.5)	331 (22.7)	763 (22.6)		
Total	1922 (56.9)	1458 (43.1)	3380 (100)		

NS – Not Significant

Among the total students with carious lesions ($n = 1458$), the prevalence of dental caries was higher in girls (55.21%) than boys (44.78). Of the total 1475 boys, 653 boys (44.27%) had caries; whereas out of the 1905 girls, 805 girls (42.25%) had caries. The relationship between gender and dental caries was not statistically significant ($p=0.241$). [Table 4, Figure 3]

Table 4: Prevalence of dental caries based on Gender

Gender	Total (n)	Total Non-Cariou (%)	Total Cariou (%)	Chi-square test value	p-value
Boys	1475	822 (42.76)	653 (44.78)	1.375	0.241 (NS)
Girls	1905	1100 (57.23)	805 (55.21)		
Total	3380	1922 (56.87)	1458 (43.13)		

NS – Not Significant

Age and gender wise distribution of dental caries in the study population showed that there was statistically no significant relationship between age and gender with respect to prevalence of dental caries ($p \geq 0.05$) [Table 5, Graph 3].

Table 5: Age group and gender-wise distribution of caries

Age groups	Total No. of boys (n)	Boys		Total No. of girls (n)	Girls		Total No. of Children with caries	Total %
		Non carious (n)	Cariou (n)		Non carious (n)	Cariou (n)		
6years	279	158	121	340	204	136	257	17.62
7years	286	151	135	340	187	153	288	19.75
8years	330	179	151	390	230	160	311	21.34
9years	267	159	108	385	222	163	271	18.59
10years	313	175	138	450	257	193	331	22.70
Total	1475	822	653	1905	1100	805	1458	100
Chi-square test value (p-value)	2.969 (0.563) [NS]			2.075 (0.722) [NS]			3.439 (0.487) [NS]	

NS – Not Significant

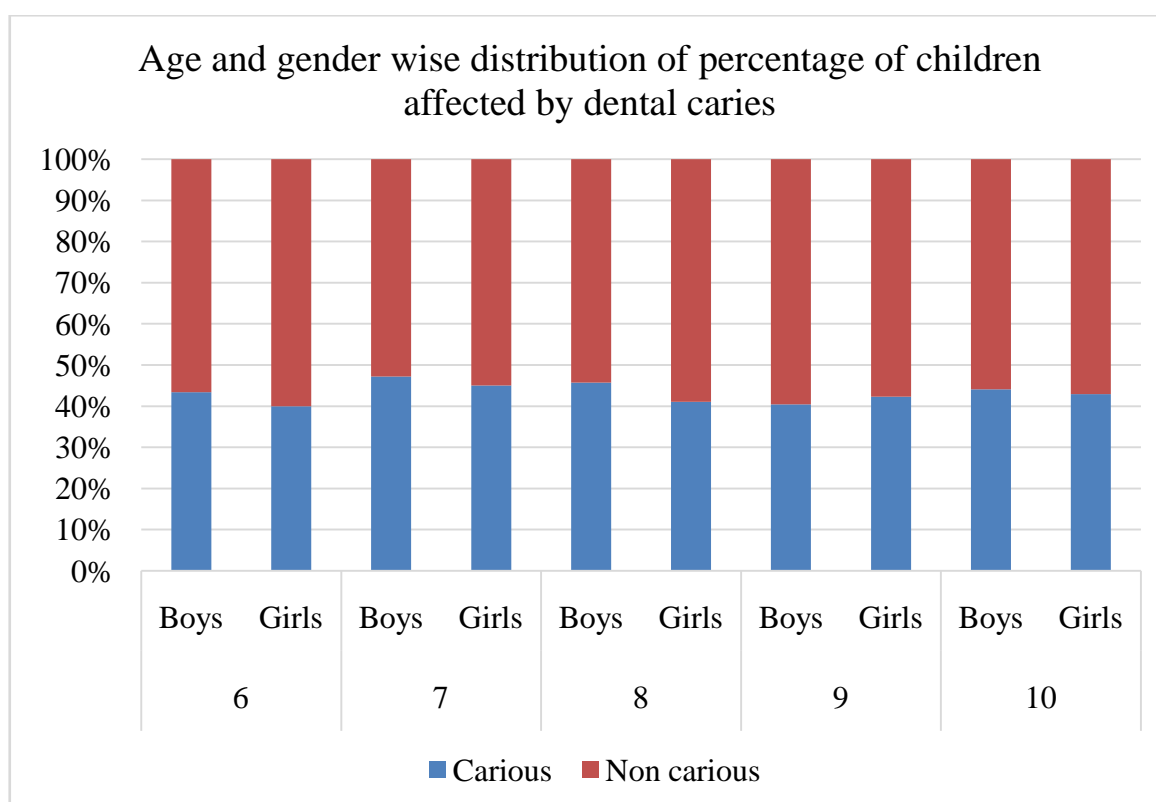


Figure3: Age and gender wise distribution of caries in percentage

5. DISCUSSION

Dental caries is a major dental public health problem around the world affecting all age groups equally. The WHO has reported the dental caries prevalence among school children to range from 60–90%; which is recognized as a pandemic.⁹ In this present study, the total prevalence of dental caries among the school going children (6–10 years) was found to be 43%. This is in concordance with the study conducted

by Prabakar J et al¹⁰ in Chandigarh among children aged between 3–17 years (47.3%). Other studies with similar accordance were, Rajesh SS et al¹¹ (6–10 years old children; prevalence of dental caries to be 49.2%), Kalita C et al¹² (3–17 years school children; 43.39%), Peedikayili et al¹³ (5–14 years children; 49.4%) and Swara SK et al¹⁴ (7–10 years; 45.5 %). Whereas, Bansal R et al¹⁵ in their study among school children, found the dental caries prevalence to be 30.9% (5–18 years), far below the present study and Shailee F et al¹⁶ found 32.6% prevalence in 12-year-olds and 42.2% in 15-year-olds; and this discrepancy can be attributed to different age groups.

In contrast, a few studies found the dental caries prevalence was higher compared to the current study population. Gabroun E et al¹⁷ found that 56% dental caries among the school going children aged between 6–14 years; likewise, Parasuraman G et al¹⁸ (5–10 years; 63.9%), Karunakaran R et al¹⁹ (4–6 years children; 65.9%), Dhar et al⁴ (6–10 years; 63.2%), Joshi et al²⁰ (6–12 years, 77%), Shitie A et al²¹ (7–10 years; 60.6%), Sultana S et al²² (4–10 years, 82.7%), Adhikari S et al²³ (3–14 years, 85.3%) and Dumitrescu R et al²⁴ (6–8 years, 86.89%).

In the present study, the dental caries was higher in girls (55.21%) than boys (44.78). Similarly, Datta et al⁵ found the dental caries was higher in girls (76%) than in boys (68.8%) in Sundarban, mostly because teeth erupt at an early age in girls. Parasuraman G et al¹⁸ and Shingare et al²⁵ found higher prevalence in girls than boys (55.4% and 46%; 41.3% and 39.6% respectively). However, in distinction, Dixit PL et al²⁶ in their study reported that the overall occurrence of dental caries was higher among boys (55%) than girls (44%). Dhar et al⁴, Garkoti et al²⁷, Joshi et al²⁰, Shitie A et al²¹ and Wang Z et al²⁸ reported in their studies that caries prevalence was higher among the boys than girls (66.91% and 59.03%; 60% and 56%; 80% and 73%; 57.7% and 31.8%; 51.53% and 48.46% respectively). While contrastingly, a few studies by Rajesh et al¹¹, Ahmed et al¹⁵, Sultana S et al²² and Adhikari S et al²³ showed the dental caries prevalence was almost equal among the female and male students (34% and 31.8%; 30.7% and 31%; 81.8% and 83.8%; 86.48% and 85.14% respectively).

In a study by Hiremath A et al²⁹, the dental caries among 6–7 yrs, 8–9 yrs and 10–11 yrs were 19%, 47.1% and 68.2% respectively. Its caries prevalence of 6–7 years (boys – 18.1%, girls – 18.6%) were similar to current study boys' and girls' caries prevalence, whereas, the other two age groups were higher compared to current study's caries prevalence among boys and girls of 8–10 years. The increase in caries prevalence as the children ages, can be contributed to the self-intake of sugary foods, unsupervised oral hygiene practices and less dental care sought from the professional end.

6. LIMITATIONS:

Since this study was conducted in a particular location and among the corporation schools alone, the chance of social desirability bias is high. Likewise, the diet history and oral hygiene habits of children was not recorded which could have had an influence on the presence or absence of dental caries.

7. RECOMMENDATIONS:

Future studies must be conducted with inclusion of diet history, oral hygiene habits, use of tobacco and dental office visits using Oral Health Questionnaire for Children (2013) from the WHO Basic Oral Health Surveys. These studies must also include data regarding specific teeth, number of teeth decayed as well as its decayed surfaces (WHO Oral Health Assessment for Children by Tooth Surfaces, 2013) for in-depth insight into the oral and dental health status in such young population.

8. CONCLUSION:

According to the oral health goal advocated by the WHO for the year 2000, 50% of 5–6-year-old children should be caries free, and the average DMFT should not be more than 3 at 12 years of age.³⁰ Striving towards a better oral health can be achieved through these recommendations based on the results of this study.

- School dental health education and training camps should be consistently planned and implemented in all schools to screen, treat and educate school children, teachers and parents.
- These trained and motivated school teachers can further be made responsible for evaluating these programs in the schools on a periodic basis.
- Mandatory oral health screening at regular pre-determined intervals along with general medical check-up must be fortified.
- Systematic community-oriented oral health promotion programmes are needed to target lifestyles and the felt needs of children.
- Support and encouragement should be given to organize preventive school dental health programmes.

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IDA (INDIAN DENTAL ASSOCIATION) collaborates with Colgate for the past 30 years in oral health programmes. Bright Smiles Bright Futures (BSBF) Colgate has launched in 200 countries worldwide. In India, lakhs of school children were benefitted from these programmes by free dental screening and free distribution of tooth paste and tooth brush for (Classes Std. I-V for the children aged 6-10 years).

Conflicts of interest

There are no conflicts of interest.

IDA (Madurai branch) Tamilnadu and Bright Smiles Bright Futures (BSBF) Colgate were assisted the free distribution of tooth paste and tooth brush for all 40 Corporation Schools (Primary and Middle) Classes Std I-V for the children aged 6-10 years.

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