Prevalence of dental caries and treatment needs among school going children of Chandigarh

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ABSTRACT

Introduction: Dental caries is the most common chronic disease of childhood that interferes with normal nutrition intake, speech, and daily routine activities. Dental caries is a lifetime disease, and the highest priority risk group is school children.

Aim: To assess the prevalence of dental caries and treatment needs among school going children of Chandigarh.

Materials and Methods: A cross-sectional study was done among school going children of Chandigarh in the age group of 3–17 years. The subjects were selected from four randomly selected schools. All the children from the selected schools were examined. A total of 4493 subjects formed the sample size. Dentition status was assessed using dft index by Gruebbel for primary dentition and DMFT index by Klein, Palmer, Knutson for permanent dentition, respectively. Chi-square test was used to find an association between the study variables. Independent t-test and one-way ANOVA were used to compare the mean difference.

Results: Among the 4493 study subjects, caries prevalence was found to be 47.9%. Mean dft and DMFT score of the population was 1.06 ± 1.995 and 0.41 ± 1.022, respectively. When analyzing the treatment needs among various age groups 42.6% of the study subjects required oral prophylaxis and 45% required restorative procedures.

Conclusion: Based on the findings, it can be concluded that high prevalence of caries was found in primary dentition than permanent dentition and most of the decayed teeth were untreated. This study emphasize the need for treating dental caries at its earliest possible stage and parents should be made aware of caries preventive measures for their children.

Key words: Dental caries, prevalence study, school age population

Dental caries is the most common chronic disease of childhood that interferes with normal nutrition intake, speech, and daily routine activities. In developing countries like India, caries prevalence have shown results ranging from 31.5% to 89%.[2‑6] Chandigarh is a union territory of India and going through a phase of rapid westernization with changing lifestyles and dietary habits.[7] Very few studies on the prevalence of dental caries among school going children of Chandigarh have been reported in the past. Hence, this present study was conducted to determine the prevalence of dental caries and treatment needs among school going children of Chandigarh.

MATERIALS AND METHODS

The present cross-sectional study was conducted as a part of the extensive screening-India Smile Campaign a joint initiative of Saveetha University and Times of India to create awareness about oral health among school children in India. There are 29 states and seven union territories in India. On a map, India was divided into North, South, East, West, and Central. A total of 16 places and 79 schools were...
selected from all the zones which include 21 schools from North, 41 schools from South, 4 schools from East, 9 schools from West, and 4 schools from Central. Out of 79 schools, four schools were randomly selected from Chandigarh city [Figure 1].

Chandigarh is a union territory of India and common capital city of Punjab and Haryana with a population of 1,054,680 and literacy rate of 86.43%. There are about 108 government aided schools, and 72 recognized private schools in Chandigarh. The subjects were selected from four randomly selected schools. All the children from the selected schools were examined. A total of 4493 subjects formed the sample size. School children in the age group of 3–17 years who were present on the day of examination were included in the study. Children under long‑term medications which affects the oral health and who were physically and mentally challenged, and children who were not willing to participate and absent on the day of examination were excluded from the study. Before the start of the study, ethical clearance was obtained from the institutional Ethics Committee, Saveetha University (SRB reference No: SRB/SDMDS12ORT15). School permissions were obtained from The Educational Department, Chandigarh. Written Group informed consent was obtained from the Headmasters of the school. Data Collection was scheduled in the month of November 2014.

Examiners were calibrated through a series of clinical training in the Department of Public Health Dentistry, Saveetha Dental College, Chennai before the start of the study and were assisted by a recorder. Interexaminer reliability was calculated by examining a group of twenty school children, and the reexamination was carried out at least 30 min after the initial examination. The kappa value was 0.78, which denotes the substantial level of agreement between the examiners.

The examination of the subjects as per guidelines of American Dental Association for Type III examination was carried out in concerned school premises using disposable mouth mirror, dental explorer, and torch light with subjects seated comfortably on an ordinary chair with backrest and the examiner sitting in front of the child. There were 11 examiners who examined the children in their respective school premises and were assisted by a recorder. Clinical examination included assessment of dental caries using decayed and filled teeth (dft) index by Gruebbel for primary dentition and decayed, missing, and filled teeth (DMFT) index by Klein, Palmer, Knutson for permanent dentition recorded on a structured format. The tooth was considered carious (D component) if there was visible evidence of a cavity, including untreated dental caries. The missing (M component) included teeth with indications for extractions or teeth extracted due to caries. The filled (F component) included filled teeth.

The structured format consisted of three sections. The first section collected demographic information of the participants such as name, age in years, gender, and their location. The second part of the format consisted of two questions regarding oral hygiene practices which included frequency of cleaning and materials used to clean the teeth. The third part consisted of data regarding dental caries experience which was recorded using dft index for primary dentition and DMFT index for permanent dentition.

Data were entered in Microsoft Excel spreadsheet and analyzed using SPSS software (IBM SPSS Statistics, Version 20.0, Armonk, NY: IBM Corp.). Descriptive statistics were used for data summarization and presentation. Chi‑square test was used to find an association between the study variables. Independent t-test and one‑way ANOVA were used to compare the mean difference. The level of statistical significance was set at a value of $P < 0.05$.

RESULTS

The study sample consisted of 4493 subjects of which 2661 (59.2%) were males and 1832 (40.8%) were females. 86 (1.9%) subjects were < 5 years, 2524 (56.2%) were between 5 and 10 years, 1739 (38.7%) were between 11 and 15 years of age group and 144 (3.2%) were more than 15 years of age [Table 1]. A total of 2708 (60.3%) study subjects brushed their teeth once daily, and only 1785 (39.7%) brushed their teeth twice daily [Figure 2]. Figure 3 presents data on oral hygiene aids used, 99.9% used toothbrush and only 4 (0.2%) used a finger to clean their teeth. Overall, the study subjects had a mean dft score of 1.06 ± 1.995 and mean DMFT score of 0.41 ± 1.022. Among the various age groups, the highest mean dft score of 1.70 ± 2.340 was found in 5–10 years and highest mean
DMFT score of $1.32 \pm 1.684$ was found in >15 years of age [Tables 2 and 3]. The mean dft and DMFT score among male and female was not significant statistically using independent t-test [Table 4]. The mean dft and DMFT score was found to be significant statistically among various age groups ($P < 0.001$) using one-way ANOVA test [Table 5]. The prevalence of dental caries in this study was 47.3%, and 52.7% were caries free [Figure 4]. The highest caries prevalence was found among males (47.5%) than females (46.9%) [Figure 5]. The study subjects exhibited caries prevalence of 40.7% till the age of 5 years and were 56.2% among 5–10 years of age and showed a decline to 34.5% among 11–15 years of age group. Further, caries prevalence was found to be increasing from the age of 15–19 years. On statistical analysis, the caries prevalence was found to be significant statistically among various age groups using trend Chi-square test ($p < 0.001$) [Figure 6]. The highest number of study subjects who required oral prophylaxis were found among 15–19 years (66%) followed by 11–15 years (49.7%) [Figure 7]. Figure 8 provides data on subjects requiring Restoration of teeth among various age groups. The highest number of study subjects who required restorative treatment were found among 5–10 years (55.9%) followed by 15–19 years (48.0%). The highest number of study subjects who required extraction of teeth were found among 5–10 years (8.3%) and more than 15 years (8.3%) followed by 11–15 years (4.6%) [Figure 9].

**DISCUSSION**

Untreated oral diseases in children frequently leads to serious general health, significant pain, and interference with eating and lost school time. Dental caries is a common oral disease occurring during childhood. Despite incredible scientific advances and the fact that caries is preventable, the disease continues to be a major public health problem. The World Health Organization (WHO) has ranked dental caries, as number three among all chronic noncommunicable diseases that require worldwide attention for prevention and treatment. Moreover, the WHO estimation of global DMFT for 12-year-old children reported that in the 188 countries which were included in their database, on a global basis, 200,335,280 teeth were decayed, filled, or missing (WHO Oral Health Database, Country/Area Profile Program, 2004). This is why WHO emphasize to continue the efforts to improve the overall situation.

**Table 1: Distribution of study subjects**

| Age group (years) | Gender, n (%) | Total, n (%) |
|-------------------|---------------|--------------|
|                   | Male          | Female       |              |
| <5                | 58 (2.2)      | 28 (1.5)     | 86 (1.9)     |
| 5-10              | 1464 (55.0)   | 1060 (57.9)  | 2524 (56.2)  |
| 11-15             | 1043 (39.2)   | 696 (38.0)   | 1739 (38.7)  |
| >15               | 96 (3.6)      | 48 (2.6)     | 144 (3.2)    |
| Total             | 2661 (100.0)  | 1832 (100.0) | 4493 (100.0) |

**Table 2: Mean dental caries experience in primary dentition**

| Age group (years) | n   | DT  | MT  | FT  | Mean (dft±SD) |
|-------------------|-----|-----|-----|-----|---------------|
| <5                | 86  | 1.51±2.62 | 0.06±0.30 | 1.56±2.624 |
| 5-10              | 2524| 1.62±2.27 | 0.10±0.47 | 1.70±2.340 |
| 11-15             | 1739| 0.17±0.61 | 0.01±0.04 | 0.18±0.728 |
| >15               | 144 | 0.00±0.00 | 0.00±0.00 | 0.00±0.00  |
| Total             | 4493| 1.00±1.93 | 0.52±0.36 | 1.06±1.995 |

**Table 3: Mean dental caries experience in permanent dentition**

| Age group (years) | n   | DT  | MT  | FT  | Mean (DMFT±SD) |
|-------------------|-----|-----|-----|-----|---------------|
| <5                | 86  | 0.04±0.4 | 0.00±0.00 | 0.01±0.03 | 0.05±0.431 |
| 5-10              | 2524| 0.17±0.61 | 0.01±0.04 | 0.01±0.03 | 0.19±0.638 |
| 11-15             | 1739| 0.62±1.23 | 0.01±0.13 | 0.05±0.31 | 0.68±1.282 |
| >15               | 144 | 1.08±1.46 | 0.04±0.20 | 0.19±0.80 | 1.32±1.684 |
| Total             | 4493| 0.37±0.96 | 0.06±0.95 | 0.03±0.2  | 0.41±1.022 |
An attempt has been made in the present study to evaluate the prevalence of dental caries and treatment needs among school going children of Chandigarh, since very few dental caries prevalence studies of Chandigarh school children have been reported in past. Therefore, this present cross-sectional study was conducted as a part of the extensive screening, a joint initiative of Saveetha University and Times of India to determine the prevalence of dental caries in school going children of Chandigarh and to evaluate the treatment needs of the study population.

The study sample consisted of 4493 subjects of which 2661 (59.2%) were males and 1832 (40.8%) were females. Eighty-six (1.9%) subjects were <5 years, 2524 (56.2%) were between 5 and 10 years, 1739 (38.7%) were between 11 and 15 years of age group and 144 (3.2%) were more than 15 years of age.
The results of the present study showed that 2708 (60.3%) study subjects brushed their teeth once daily, and only 1785 (39.7%) brushed their teeth twice daily. Very similar results were also reported by Harikiran et al. in a study among 11–12-year-old schoolchildren of Bengaluru, found that only 38.5% of the children brushed their teeth two or more times a day. Another study among 12–15-year-old school students in Tamil Nadu also revealed that only 30.7% of the students brushed their teeth two or more times a day. In contrast to the above results a study by Lian et al., among secondary school students showed that about 95.7% of the respondents brush their teeth at least twice per day. The decreased frequency of tooth brushing in the present study mainly due to lack of knowledge on the importance of tooth brushing and its effect on dental health. Almost all of the respondents brushed their teeth using toothbrush (99.8%) and toothpaste (100%). The similar results have been shown in a study done by Lian et al. where the majority of the respondents (97.6%) brushed their teeth with toothbrush and toothpaste.

The overall prevalence of dental caries in the present study was found to be 47.3% which is less than the reported caries prevalence of India (i.e. 53.8%) in National Oral Health Survey and males (47.5%) were slightly more affected than females (46.9%). These findings are similar to the studies of Arora Sachit et al. and Yevenes et al. This marginal difference could be attributed to the diet as more priority is given to a male child than a female child in the Indian society. Moreover, females are found to have better personal hygiene than males. On the contrary females were found to have higher caries prevalence by Shingare et al. and Mosha et al.

The present study reported the prevalence of dental caries below 5 years to be 40.6%. The results were similar to a study conducted by Sonika et al. among 3–4-year-old children with a caries prevalence of 37.4%, however, the prevalence in the present study was observed to be high when compared to Arora Sachit et al. who reported a very low caries prevalence of 30.6% among preschool children which is mainly attributed to selection of school children and socioeconomic status. In Arora Sachit et al. school children were selected from affluent society and higher socioeconomic status.

The dental caries prevalence among 5–10 years in the present study were found to be 56.2% and was consistent with caries prevalence observed by Chatufole and Goyal which was 55.33%. On the contrary, Shingare et al. reported higher caries prevalence (88.6%) among 7–10-year-old schoolchildren.

The present study reported caries prevalence to be 34.5% among 11–15 years. The wide variation of caries prevalence in this age group has been reported. In a study conducted by Malvania et al. a caries prevalence of 17.15% was observed. On the contrary, studies conducted by Al-Darwish et al. and Datta and Datta have reported caries prevalence ranging from 72% to 87%. Lower caries prevalence in the present study is mainly because most of the deciduous teeth have been exfoliated and premolars have not been in the oral cavity long enough for caries to set in.

The present study reported the prevalence of dental caries above 15 years to be 50%. The results of the present study were in agreement with the study conducted by Kaur et al. which showed a higher prevalence of 67.60%. The reason for lower caries prevalence in the present study is due to increased awareness for good oral hygiene and increased manual dexterity and may also be due to the structural differences that may increase caries susceptibility in deciduous teeth.

The study subjects exhibited caries prevalence of 40.7% till the age of 5 years, 56.2% among 5–10 years of age and showed a decline to 34.5% among 11–15 years of age group. Dash et al. and Shingare et al. also observed the pattern in which caries was increasing from 5 years to 8 years and subsequently decreased at 11 and 15 years. The difference observed can be attributed to the fact that the carious deciduous first and second molars are replaced by newly erupted premolars by the age of 12 years. Further, caries prevalence was found to be increasing from the age of 15–19 years. This pattern is not seen by other authors and it reflects that the total number of children affected by caries is increasing over the years whereas decayed component per child is decreasing during the late mixed dentition period.

When analyzing the treatment needs amongst the different age groups, 42.6% of the study subjects required oral prophylaxis and 45% were restorative in nature. Dash et al. Dhar et al. and Saravanan et al. had also found the higher restorative

### Table 4: Comparison of mean decayed filled teeth and decayed, missing, and filled teeth score based on gender

| Score | Gender | n   | Mean | SD  | T    | P     |
|-------|--------|-----|------|-----|------|-------|
| dft score | Male | 2661 | 1.07 | 2.006 | 0.651 | 0.515 |
|        | Female | 1832 | 1.03 | 1.981 | 0.412 | 0.681 |
| DMFT score | Male | 2661 | 0.40 | 1.055 | 1.169 | 0.243 |
|        | Female | 1832 | 0.43 | 1.046 | 0.065 | 0.950 |

Independent t-test, statistically not significant. DMF=Decayed missing and filled teeth, dft=Decayed filled teeth, SD=Standard deviation

### Table 5: Comparison of mean decayed filled teeth and decayed, missing, and filled teeth score among various age groups

| Score | Age group (years) | n   | Mean | SD  | F    | P     |
|-------|-------------------|-----|------|-----|------|-------|
| dft score | <5 | 86  | 1.56 | 2.624 | 250.405 | <0.001* |
|        | 5-10 | 2524 | 1.70 | 2.340 | 0.728 | 0.403 |
|        | 11-15 | 1729 | 0.18 | 0.728 | 0.412 | 0.681 |
|        | >15 | 144  | 0.00 | 0.000 | 0.000 | 0.000 |
| Total  | 4493  | 1.06 | 1.995 | 0.000 | 0.000 | 0.000 |
| DMFT score | <5 | 86  | 0.05 | 0.431 | 134.250 | <0.001* |
|        | 5-10 | 2524 | 0.19 | 0.638 | 0.000 | 0.000 |
|        | 11-15 | 1729 | 0.68 | 1.282 | 0.000 | 0.000 |
|        | >15 | 144  | 1.32 | 1.684 | 0.000 | 0.000 |
| Total  | 4493  | 0.41 | 1.022 | 0.000 | 0.000 | 0.000 |

One-way ANOVA, significance level P<0.05. DMF=Decayed missing filled, SD=Standard deviation, dft=Decayed filled teeth, *significant
need of treatment. Data of treatment needs to provide a basis for the type of treatment required for a population and with the existing infrastructure and manpower facilities, it is difficult to provide curative treatment to such a vast and diverse population as access and affordability to the dental facilities become a constraint for majority of the population. Therefore, for effective management of dental caries, emphasis should be laid on designing suitable preventive and promotional oral health strategies.

CONCLUSION

Based on the findings of the present study, it can be concluded that frequency of brushing teeth twice daily was reported to be very low which reveals lacunae in the awareness of oral hygiene measures and its importance on oral health. The present study reported a high prevalence of dental caries in primary dentition than permanent dentition and most of the decayed teeth were untreated.

Even though literature reveals dental caries has been declining in adult population globally, the caries prevalence in young children has not shown a significant decline. This implies an urgent need for awareness initiative for preventive dental health behavior and attitudes, which is beneficial for the lifetime. This can be achieved by educating the parents about dental health through school dental health program. Parents should be made aware of brushing methods, usage of pit and fissure sealants and the importance of preventive measures for the children.

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Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Grewal H, Verma M, Kumar A. Prevalence of dental caries and treatment needs in the rural child population of Nainital District, Uttaranchal. J Indian Soc Pedod Prev Dent 2009;27:224-6.
2. Damle SC, Patel AR. Caries prevalence and treatment need amongst children of Dharavi, Bombay, India. Community Dent Oral Epidemiol 1994;22:62-3.
3. Tewari A, Chawla HS. Study of prevalence of dental caries in an urban area of India (Chandigarh). J Indian Dent Assoc 1977;49:231-9.
4. Dash JK, Sahoo PK, Bhuyan SK, Sahoo SK. Prevalence of dental caries and treatment needs among children of Cuttack (Orissa). J Indian Soc Pedod Prev Dent 2002;20:139-43.
5. Dhar V, Jain A, Van Dyke TE, Kohli A. Prevalence of dental caries and treatment needs in the school-going children of rural areas in Udaipur district. J Indian Soc Pedod Prev Dent 2007;25:119-21.
6. Saravanan S, Kalyani V, Vijayarani MP, Jayakodi P, Felix J, Arumughozi P, et al. Caries prevalence and treatment needs of rural schoolchildren in Chidambaram Taluk, Tamil Nadu, South India. Indian J Dent Res 2008;19:186-90.
7. Sohi RK, Gambhir RS, Veeresha KL, Randhawa AK, Singh G. Assessment of prevalence of dental caries among 5 and 12-year-old schoolchildren in Chandigarh (U.T.), India. Arch Oral Res 2012;8:39-45.
8. Awooda EM, Saeed SM, Elbasir EI. Caries prevalence among 3-5 years old children in Khartoum state, Sudan. Innov J Med Health Sci 2013;3:42-4.
9. Naidu R, Pruvatt I, Simeon D. The oral health and treatment needs of schoolchildren in Trinidad and Tobago: Findings of a national survey. Int J Paediatri Dent 2006;16:412-8.
10. Marra JA, Trumbley S, Malik G. Early childhood caries: Determining the risk factors and assessing the prevention strategies for nursing intervention. Pediatr Nurs 2011;37:9-15.
11. Brathall D. Estimation of global DMFT for 12-year-olds in 2004. Int Dent J 2005;55:370-2.
12. Harikiran AG, Pallavi SK, Hariprakash S, Ashutosh, Nagesh KS. Oral health-related KAP among 11- to 12-year-old school children in a government-aided missionary school of Bangalore city. Indian J Dent Res 2008;19:236-42.
13. Prasad AK, Shankar S, Somwyna J, Priyaa CV. Oral health knowledge attitude practice of school students of KSR Matriculation School, Tiruchengode. J Indian Acad Dent Spec 2010;1:5-10.
14. Lian CW, Phing TS, Chan CS, Shin BC, Baharuddin LH, Che'Jalil ZB. Oral health knowledge, attitude and practice among secondary school students in Kuching, Sarawak, Arch Oral Sci 2010;5:9-16.
15. National Oral Health Care Program Implementation Strategies, Project of DGHS, MOH and FW. Govt. of India, Submitted by Hari Prakash and Naseem Shah, Department of Dental Surgery, AIIMS, Ansari Nagar, New Delhi; 2004.
16. Arora Sachit A, Sumeet S, Puneet A, Darrel S, Anil C. Prevalence of dental caries among pre-school children of greater Noida city, UP (India), Indian J Dent Sci 2012;4:4-6.
17. Yevenes I, Bustos BC, Ramos AA, Espinoza RM, Jara MN, Petrasic Smith L. Prevalence of dental caries in pre-school children in Penalol, Santiago, Chile. Rev Odonto Cienc 2009;24:116-9.
18. Shingare P, Jogani V, Sevekar S, Patil S, Jha M. Dental caries prevalence among 3 to 14 year old school children, Uraan, Raigad district, Maharashtra. J Contemp Den Dent 2012;2:11-4.
19. HJ Mosha, AR Senkoro, JRP Masalu, F Kahabuka, G Mandari, L Mabelya, et al. Oral health status and treatment needs among Tanzanian of different age groups, Tanzania. Tanzania Dent J 2005;12:18-27.
20. Sonika R, Goel S, Vijaylakshmi S, Goel NK. Prevalence of dental caries and its association with Snyder test among preschool children in anganwadis of a North Indian city. Int J Public Health Dent 2012;3:1-10.
21. Chatufale JD, Goyal RC. A cross sectional study of factors related to oral health in rural area of Loni, Westen Maharashtra. Indian J Commun Med 2002;27:74.
22. Mahvania EA, Ajithkrishnan CG, Thanveer K, Hongal S. Prevalence of dental caries and treatment needs among 12-year-old school going children in Vadodara City, Gujarat, India: A cross-sectional study, Indian J Oral Sci 2014;5:3-9.
23. Ali Darwish M, El Ansari W, Benner A. Prevalence of dental caries among 12-14 year old children in Qatar. Saudi Dent J 2014:26:115-25.
24. Datta P, Datta PP. Prevalence of dental caries among school children in Sundarban, India. Epidemiology 2013;3:1-4.
25. Kaur R, Kataria H, Kumar S, Kaur G. Caries experience among females aged 16-21 in Punjab, India and its relationship with lifestyle and salivary HSP70 levels. Eur J Dent 2010:4:308-13.
26. Mandal KP, Tewari AB, Chawla HS, Gauba KD. Prevalence and severity of dental caries and treatment needs among population in the Eastern states of India. J Indian Soc Pedod Prev Dent 2001;19:85-91.