

## Dental caries experience and treatment needs among 12-year-old schoolchildren in Chennai, Tamil Nadu

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### ABSTRACT

**Aim:** To evaluate the dental caries experience and treatment needs among 12-year-old schoolchildren in Chennai. **Materials and Methods:** This cross-sectional study was conducted on 714 12-year-old schoolchildren in Chennai. A cluster sampling methodology was used. Each school, which was selected through simple random sampling, was considered a cluster. New clusters were included until the desired sample size was achieved. Dentition status and treatment need index from the World Health Organization (WHO) oral health assessment form were used. From the raw data obtained, significant caries index score was calculated. Data were analyzed using SPSS software. **Results:** At 12 years of age, the prevalence of dental caries was 31% with a mean decay of  $0.57 \pm 1.03$ . Females had a higher level of caries than males. The “decayed” component was the biggest contributor to the decayed missing and filled teeth index. The highest treatment need was one surface restoration. **Conclusion:** The caries experience of 12-year-old children was low as compared to the WHO - “recommended” values. Effective oral health promotion strategies need to be implemented to further improve the dental health of schoolchildren in Chennai city.

**Key words:** Dental caries, Prevalence, Schoolchildren, Treatment needs

Dental caries constitutes the major oral health problem in most of the regions of the world. There are practically no geographical areas in the world whose inhabitants do not exhibit some evidence of dental caries. It is the most prevalent chronic disease affecting persons of both sexes in all races, all socioeconomic strata, and every age group especially children [1]. The global distribution of dental caries presents a varied picture, and most of the countries with low caries prevalence are experiencing an unprecedented increase in caries prevalence and severity of dental caries including India [2]. The polarization of caries is occurring on a worldwide basis, where the prevalence of caries is declining in developed countries, increasing in less-developed countries and is epidemic in countries with emerging economies [3]. This decline in caries prevalence in developed countries has been associated with a more sensible approach to sugar consumption, improved oral hygiene practices, and several preventive programs.

In developing countries, the prevalence of caries is high due to the oral health-care systems in these countries mostly focus on curative care, whereas oral health promotion and community-based prevention have not been systematically implemented [4]. Children at the age of 12 years are especially important; as generally at this age, children leave primary school. Therefore, in many countries, it is the last age at

which a reliable sample may be obtained easily through the school system. Furthermore, it is likely that by this age all the permanent teeth except the third molars would have erupted. The World Health Organization (WHO) estimation of global decayed missing and filled teeth (DMFT) score in 188 countries for 12 years was found to be 200, 335, 280 [5].

For these reasons, 12 years of age has been chosen as the global indicator age group for international comparisons and surveillance of disease trends. For the same reason, 12 years is the age of interest in our study. On analyzing the available literature for similar studies in the south Indian population, only a few studies were available [6]. Hence, this study was planned to assess the recent trends and to achieve a baseline data for further health-care services planning and research purposes.

### MATERIALS AND METHODS

This cross-sectional study was conducted on 714 12-year-old schoolchildren in Chennai.

According to the WHO Oral Health Survey Manual [7], age has been recorded as age at last birthday (i.e., a child in the 13<sup>th</sup> year of life is taken as 12-year-old). The sample size was based on the studies conducted by Malvania et al. [8] and

Fotedar et al., at 80% power and 5% alpha error. Chennai being one of the busy metropolitan city houses about 220 recognized high schools and these schools formed our sampling frame. A cluster sampling methodology was used. Each school, which was selected through simple random sampling, was considered a cluster. New clusters were included until the desired sample size was achieved.

Subject who were willing and present on the day of examination were included in the study. Subjects who were physically or mentally challenged or receiving long-term medications which may have an impact on their oral health were not included in this study. Prior ethical clearance was obtained from the scientific review board of Saveetha University. Group informed consent was obtained from the respective school before the examination. Data collection was scheduled over a period of 4-month from September 2015 to December 2015.

Examination was done by single investigator who was trained and calibrated in the Department of Public Health Dentistry, Saveetha Dental College. Intraexaminer reliability was calculated by examining 5% of the total sample and re-examination was carried out at least 30 minutes after the initial examination by the same examiner. The kappa value was 0.78, which denotes the substantial level of agreement.

**Survey Instrument and Procedure**

Dentition status and treatment needs index from the WHO oral health assessment form were used [7]. Apart from this, the pro forma had basic demographic detail including mother tongue, permanent residential status, and oral hygiene practices of student. The DMFT index is one of the simplest and the most commonly used index in epidemiologic surveys of dental caries. It quantifies dental health status based on the number of carious, missing and filled teeth. From the raw data obtained, significant caries (SiC) index score was calculated [9]. The SiC index was introduced to bring attention to individuals with the highest caries values in each population. The one-third of the population with the highest caries score is selected, and the mean DMFT for this subgroup is calculated. This value constitutes the SiC Index.

Data were analyzed using SPSS software (IBM SPSS Statistics Version 22). Descriptive statistics was done using frequency, mean, and standard deviation. Inferential statistics done using  $\chi^2$ , 5% was set as the significance level.

**RESULTS**

A total of 714 children were surveyed comprising of 368 boys and 346 girls. A total of 7 schools were selected randomly. The dental caries experience among the study subject was found to be 31%. The caries prevalence among boys was 49% and of

girls was 51%. Factors such as resident status, mother tongue, previous orthodontic treatment, and frequency of brushing were taken into consideration (Table 1). On statistical analysis, only frequency of brushing was found to have an impact on caries experience as shown in Table 2 and decrease in the prevalence of dental caries was seen with twice brushing. Table 3 depicts the comparison of mean DMFT and SiC scores. The mean DMFT score was  $0.57 \pm 1.03$ , and SiC index score was  $1.73 \pm 1.10$ . Table 4 depicts the differential treatment needs among 12-year-old children.

**Table 1: Resident status, mother tongue, and previous orthodontic treatment related to dental caries**

Factors	DMFT						Total
	0	1	2	3	4	5	
Resident status							
Primary	70	10	18	2	2	0	102
Secondary	370	68	50	18	18	0	524
Tertiary	58	12	12	2	2	2	88
Total	498	90	80	22	22	2	714
Mother tongue							
Tamil	434	82	72	20	22	2	632
Telugu	24	0	4	0	0	0	28
Hindi	22	4	0	2	0	0	28
Malayalam	18	4	4	0	0	0	26
Total	498	90	80	22	22	2	714
Previous orthodontic treatment							
Yes	57	12	4	4	0	0	77
No	441	78	76	18	22	2	637
Total	498	90	80	22	22	2	714

DMFT: Decayed missing and filled teeth

**Table 2: Frequency of brushing impact on dental caries experience**

Frequency	DMFT						Total
	0.00	1.00	2.00	3.00	4.00	5.00	
Once	474	82	80	18	20	2	676
Twice	24	8	0	4	2	0	38
Total	498	90	80	22	22	2	714

DMFT: Decayed missing and filled teeth

**Table 3: Comparison of mean DMFT and SiC score among 12 years age group**

Score	n	Mean±SD
DMFT score	714	$0.57 \pm 1.03$
SiC score	238	$1.73 \pm 1.10$

DMFT: Decayed missing and filled teeth, SD: Standard deviation, SiC: Significant caries

**Table 4: Differential treatment needs among 12-year-old children**

Treatment	n (%)
Children examined	714
Preventive care	128 (18)
Fissure sealant	164 (23)
One surface filling	224 (31)
Two or more surface filling	52 (7.2)
Crown	4 (0.5)
Pulp care	12 (1.6)
Extraction	10 (1.4)
Other care	0 (0)

## DISCUSSION

In this study, the overall prevalence of dental caries was 31%. However, our values are low as compared to 52.5% reported by the National Oral Health Survey [10]. It is likely that low level of prevalence in this study compared to other studies might be due to less frequent consumption of cariogenic food along with good oral hygiene practices in all the subjects as all the subjects were using fluoridated toothpaste and toothbrush for cleaning of teeth [11]. Girls showed higher caries prevalence than boys. This can be attributed to the early eruption of teeth among them leading to a longer period of exposure to the oral environment compared with males [12]. Similar results were obtained by studies conducted by Sunayana et al. [13], Varenne et al. [14], and Avinash et al. [15].

In our study, maximum number 676 (94%) of children brushed their teeth once in a day. These results are in accordance with the study conducted by Shailee et al. [16] but were higher than seen by Harikiran et al. [17]. In our study, the prevalence of dental caries decreased with twice brushing. This finding is consistent with the findings of Christina and Anna [18], Wei et al. [19], and Sethi and Tandon [20].

Decayed component constituted a major part of the DMFT scores. The WHO classified the mean DMFT of 12-year-old children in worldwide into four categories: Very low <1.2, low 1.2-2.6, moderate 2.7-4.4, and high 4.4 [21]. In our study, the mean DMFT was 0.57, and similar values were also reported by Naidu et al. [22], Petersen and Kaka [23], and Bajomo et al. [24]. The SiC Index was calculated to focus attention on those individuals with the highest caries scores in each population. As expected, the SiC index score was higher in all comparison with DMFT, which is agreement with other studies [25,26]. A comparison between DMFT and SiC indices indicated there is a subgroup that presented with a higher caries rate.

We found that the greatest treatment need was for one surface restoration followed by fissure sealant, preventive care, two-surface restorations, pulp care, and extractions. It was

calculated by dentition status and treatment needs index from the WHO oral health assessment. This is similar to the findings of Ditmyer et al. [27] and Dash et al. [28]. To further improve the oral health of children, we recommend oral health promotion through well-structured oral health education program, which can create positive change in awareness for special groups such as schoolchildren. Awareness among students can be generated by the school teachers because they are the role model for the students. Furthermore, parents should be aware of the dental health of their children.

With the limitation of this study, further studies are required to correlate dental caries prevalence in the target population with parent's literacy level and other socio-behavioral factors. Although the severity of dental caries is not assessed separately in this study, the data regarding treatment need gives a glimpse of the severity of dental caries in the study subjects.

## CONCLUSION

The mean DMFT in 12-year-old children in Chennai city, as revealed by the study falls within the "very low" category as per the WHO classification, but most of the decayed teeth were untreated. Girls showed higher caries prevalence than boys. Hence, the dental professionals should make it as a point to screen each child for dental problems to treat them at the earliest, so as to prevent their adverse effects in future.

## REFERENCES

1. Prakash H, Sidhu SS, Sundaram KR. Prevalence of dental caries among Delhi school children. *J Indian Dent Assoc.* 1999;70:12-4.
2. 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.
3. Sudha P, Bhasin S, Anegundi RT. Prevalence of dental caries among 5-13-year-old children of Mangalore city. *J Indian Soc Pedod Prev Dent.* 2005;23(2):74-9.
4. Shourie KL. Dental caries in Indian children. *Indian J Medical Res.* 1941;29:709-21.
5. Bratthall D. Estimation of global DMFT for 12-year-olds in 2004. *Int Dent J.* 2005;55(6):370-2.
6. Moses J, Rangeeth BN, Gurunathan D. Prevalence of dental caries, socio-economic status and treatment needs among 5 to 15 year old school going children of Chidambaram. *J Clin Diagn Res.* 2011;5(1):146-51.
7. World Health Organization. *Oral Health Surveys: Basic Methods.* Geneva: World Health Organization; 1987.
8. Malvania 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 Oral Sci.* 2014;5(1):3.
9. Bratthall D. Introducing the significant caries index together with a proposal for a new global oral health goal for 12-year-olds. *Int Dent J.* 2000;50(6):378-84.
10. National oral Health Care Program Implementation Strategies. New Delhi: Project of DGHS, MOH and FW, Department of

- Dental Surgery, AIIMS; 2004.
11. Walsh T, Worthington HV, Glenny AM, Appelbe P, Marinho VC, Shi X. Fluoride toothpastes of different concentrations for preventing dental caries in children and adolescents. *Cochrane Database Syst Rev.* 2010;(1):CD007868.
  12. Saravanan S, Kalyani V, Vijayarani MP, Jayakodi P, Felix J, Arunmozhi P, et al. Caries prevalence and treatment needs of rural school children in Chidambaram Taluk, Tamil Nadu, South India. *Indian J Dent Res.* 2008;19(3):186-90.
  13. Sunayana G, John J, Sarvnan S, Arumugham IM. Prevalence of dental caries among 12 and 15 year old school children in Chennai city. *J Indian Assoc Public Health Dent.* 2009;13:54-9.
  14. Varenne B, Petersen PE, Ouattara S. Oral health status of children and adults in urban and rural areas of Burkina Faso, Africa. *Int Dent J.* 2004;54(2):83-9.
  15. Avinash J, Bhaskar DJ, Mathur A, Khushboo SG. Dental caries status among 12 and 15 year old school going children in urban and rural settlements of Bangalore, India. *J Oral Health Res.* 2010;1:19-25.
  16. Shailee F, Sogi GM, Sharma KR, Nidhi P. Dental caries prevalence and treatment needs among 12 - and 15- Year old schoolchildren in Shimla city, Himachal Pradesh, India. *Indian J Dent Res.* 2012;23(5):579-84.
  17. 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(3):236-42.
  18. Christina SB, Anna KH. Dental caries in Swedish 4 year old children. *Swed Dent J.* 1989;13:39-44.
  19. Wei SH, Holm AK, Tong LS, Yuen SW. Dental caries prevalence and related factors in 5-year-old children in Hong Kong. *Pediatr Dent.* 1993;15(2):116-9.
  20. Sethi B, Tandon S. Caries pattern in preschoolchildren. *J Indian Dent Assoc.* 1996;67:141-5.
  21. World Health Organisation. *Global Oral Health Data Bank.* Geneva: World Health Organisation; 2002.
  22. Naidu R, Prevatt I, Simeon D. The oral health and treatment needs of schoolchildren in Trinidad and Tobago: Findings of a national survey. *Int J Paediatr Dent.* 2006;16(6):412-8.
  23. Petersen PE, Kaka M. Oral health status of children and adults in the Republic of Niger, Africa. *Int Dent J.* 1999;49(3):159-64.
  24. Bajomo AS, Rudolph MJ, Ogunbodede EO. Dental caries in six, 12 and 15 year old Venda children in South Africa. *East Afr Med J.* 2004;81(5):236-43.
  25. Kulkarni SS, Deshpande SD. Caries prevalence and treatment needs in 11-15 year old children of Belgaum city. *J Indian Soc Pedod Prev Dent.* 2002;20(1):12-5.
  26. Namal N, Yuceokur AA, Can G. Significant caries index values and related factors in 5-6-year-old children in Istanbul, Turkey. *EMHJ Eastern Mediterranean Health J.* 2009;15(1):178-84.
  27. Ditmyer M, Dounis G, Mobley C, Schwarz E. Inequalities of caries experience in Nevada youth expressed by DMFT index vs. Significant Caries Index (SiC) over time. *BMC Oral Health.* 2011;11:12.
  28. 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(4):139-43.

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