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Assessment of prevalence of dental caries among 5 and 12-year-old schoolchildren in Chandigarh (U.T.), India

Avaliação da prevalência de cárie dental em crianças com idades entre 5 e 12 anos em Chandigarh (U.T.), Índia

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Abstract

Objectives: To assess the prevalence of dental caries among 5 and 12-year-old schoolchildren in Chandigarh and to explore and suggest suitable preventive programmes for the prevention of dental caries in this population. **Materials and methods**: Twenty out of 101 schools were randomly selected for the study. A total of 1113 subjects were examined from May 2008 to September 2009. Data regarding dental caries experience using dmft index for 5-year-old and DMFT index for 12-year-old school children were collected on a structured format. **Results**: Among the 5-year-old children examined, 46.8% (271) were females and 53.2% (308) were males. Considering the 12-year-old age group, 46.6 % (249) were females and 53.4% (285) were males. Regarding the 5-year-old age group, 48.3% (579) of subjects were affected with dental caries, and in the 12-year-old age group, the amount was 30.52% (534). The prevalence of dental caries was more in 5 years age group. **Conclusion**: In the present study, it was observed that 51.7% of the 5-year-old subjects were caries free and the mean DMFT was 0.53 at 12 years of age. Hence, it may be concluded that W.H.O. global oral health goals for 5 and 12 year olds are achieved in Chandigarh. Still, as public health people, we have to aim at achieving '0' (zero) DMFT for all school going children.

Keywords: Dental caries. Schoolchildren. 5 years of age. 12 years of age.

Resumo

Objetivos*: Avaliar a prevalência de cárie dentária em crianças com idade entre 5 e 12 anos em Chandigarh, e explorar e sugerir programas para a prevenção da cárie dentária nesta população.* ***Materiais e métodos****: Vinte de 101 escolas foram selecionadas aleatoriamente para o estudo. Um total de 1.113 indivíduos foram examinados entre maio de 2008 e setembro de 2009. Os dados referentes à experiência de cárie foram coletados em um formato estruturado pelo índice cpo-d para 5 anos e índice CPO-D para crianças de 12 de idade.* ***Resultados****: Dentre as crianças de 5 anos examinadas, 46.8% (271) eram do gênero feminino e 53.2% (308) eram do gênero masculino. No grupo de 12 anos, 46.6% (249) eram do gênero feminino e 53.4% (285) eram do gênero masculino. No grupo de 5 anos de idade, 48.3% (579) dos sujeitos foram afetados por cáries; já no grupo de 12 anos de idade, o percentual foi de 30.52% (534). A prevalência de cárie foi maior no grupo de 5 anos.* ***Conclusão****: No presente estudo, observou-se que 51.7% das crianças de 5 anos eram livres de cárie e a média de CPO-D foi de 0.53 para o grupo de 12 anos. Desse modo, foi possível concluir que as metas da OMS para saúde bucal para crianças de 5 e 12 anos de idade foram atingidas em Chandigarh. Porém, na condição de pessoas de saúde pública temos que atingir o objetivo de CPOD "zero" para todas as crianças em idade escolar.*

Palavras-chave*: Cárie dental. Crianças em idade escolar. 5 anos de idade. 12 anos de idade.*

Introduction

Children are very important part of a country's demography, and children's health determines the future of the nation. School age is regarded as the phase of childhood during which a child acquires the knowledge of the norms and values of a society and emerges as a contributing member to the community.

Dental caries is still a major oral health problem in most industrialized countries, affecting 60-90% of schoolchildren and the vast majority of adults. It is also a most prevalent oral disease in several Asian and Latin-American countries, while it appears to be less common and less severe in most African countries (1). It is the most common chronic disease of childhood that interferes with normal nutrition intake, speech, self-esteem and daily routine activities, because the caries pain adversely affects the normal food intake. This results in underweight children with abnormal cognitive development (2).

At 5 years all the deciduous teeth would have been erupted. Also, this is the age when children are usually admitted to schools. Primary teeth begin to shed from about the age of 5 years onwards. If children are examined after this age, the record of primary teeth will be incomplete. It can be called as end-phase of primary dentition. At the age of 12 years, permanent teeth (except third molar) would have been erupted. Both these ages are the index ages for oral health assessment suggested by the W.H.O. (3).

India, a developing nation, has shown an inclined trend of this disease over a relatively short period of time. In 1940, the prevalence of dental caries in 5 and 12-year-old schoolchildren in India was 55.5% and it rose to 68% in the 1960s and climbed to 89% in subsequent years (4-6).

Chandigarh is a union territory of India and the common capital of two states, Punjab and Haryana. Chandigarh is going through a phase of rapid westernization with changing lifestyles and dietary habits. An earlier cross-sectional study conducted in 1993 in Chandigarh showed a mean DMFT to 1.12 ± 1.35 in 15-year-old children as compared to the mean of 4.7 in 1977 (7). Another study conducted on 6, 9, 12 and 15-year-old schoolchildren of Chandigarh found mean deft to be 4.0 ± 3.6 in 6 year olds and 4.61 ± 3.14 in 9 year olds, whereas the mean DMFT in 12 and 15 year olds was found to be 3.03 ± 2.52 and 3.82 ± 2.85, respectively (8). The caries prevalence at 5 and 12 years depicts the outcome of the care received by the deciduous and permanent teeth. The prevalence of dental caries among 5 and 12 years reveals lacunae if any in preventive and curative treatments which can be fulfilled by suitable programs. Therefore, this study has been carried out to assess baseline data for planning preventive programs. The objective of this study was to assess the prevalence of dental caries among 5 and 12-year-old schoolchildren.

Materials and methods

The present study was conducted on schoolchildren of 5 and 12 years of age to assess the prevalence of dental caries in Chandigarh, Union Territory (India). A pilot study was conducted among 50 schoolchildren to assess the feasibility of the study. Prior permission and the list of schools were taken from the Education Officer, Chandigarh. Ethical clearance to conduct the study was taken from the Institution Review Board, M.M. University, Mullana.

On a map, Chandigarh was divided into four zones: North, South, East and West. In each zone, five schools were randomly selected in order to have equal representation from each zone. Hence, a total of 20 schools were selected from the list of 103 government schools. In each of the age groups an attempt was made to include equal number of male and female subjects. The sample size necessary for the study was calculated on the basis of prevalence which was obtained from the pilot study done on 50 subjects. Hence, a total of 20 schools were selected from the list of 103 government schools.

Data collection

Examiner was calibrated in the department prior to study and was assisted by a recorder. The study was conducted from May 2008 to September 2009. The schedule of visits to schools was prepared after obtaining prior permission from the concerned authorities of the Education Department of Chandigarh. Informed consent was also taken from the children's parents. A total of 1113 subjects were examined.

Examination

The age of children was taken from the school records, and based on that, all the children of 5 and 12 years old in the 20 selected schools were examined. Dental examination was conducted with the use of mouth mirror, tweezer, personal protective barriers (gloves, masks) and cotton roll. Natural light was used for examination, aided by flashlight (Type III examination). Data regarding dental caries experience was recorded using dmft index for 5-year schoolchildren and DMFT index for 12-year schoolchildren on a structured format (9). The tooth was considered carious (d component) if there was visible evidence of a cavity, including untreated dental caries. No radiographs were taken during the study. The missing (m component) included teeth with indications for extractions or teeth extracted due to caries. The filled (f component) included filled teeth. Body Mass Index (B.M.I.) was calculated by measuring height in meters from a scale which was fitted on the wall and weight was measured from the weighing machine. The purpose of calculating BMI was to get an overview regarding the nutritional status of the children, which can have influence on dental caries (10). Level of fluorosis was also calculated as it can have an influence on the caries status of the subjects.

After each examination camp, the names of the children who needed dental treatment were given to the class teacher to inform the parents. Health education was given to schoolchildren after each survey camp.

Statistical analysis

The data were analyzed using SPSS version 13.0 and Epi (info). One-way analysis of variance (ANOVA) and Z-test were used to determine differences at the 5% significance level ($p < 0.05$) whereas proportions were compared by the use of Chi-square test. Statistical significance was defined when $p < 0.05$.

Results

The distribution of study population according to age and gender is shown in Figure 1. It is comprised of 52% (579) of 5-year-old and 48% (534) of 12-year-old children. Most of the subjects, 63.16% (703), belonged to normal range of body mass index (i.e. 18.5-24.99).

The prevalence of dental caries in the group of 5 years of age was 48.3% (280) while in the other group it was 30.5% (163). This difference was statistically significant ($p < 0.05$). In the 5-year-old group, 42.2% (130) of the males and 55.35 % (150) of the females were affected with dental caries ($p < 0.05$) (Table 1).

The mean dmft value in the 5-year-old group was 1.8 ± 2.1 while mean DMFT in 12-year-old group was 0.5 ± 0.6. The mean dmft value in 5-year-old group was 1.90 for males and 1.68 for females. In the

12-year-old group the mean DMFT value was 0.58 for males and 0.48 for females. The mean dmft/DMFT was higher in males than in females. In 12-year-old group the mean dft value was 0.09 for males and 0.17 for females. The mean dmft/DMFT (5 and 12 years) according to gender was not significant. The mean dft score of 12-year-old group was higher in females than in males (0.17 and 0.09, respectively) and it was not statistically significant.

In the 5-year-old group, the component of dmft was 85.3% (892) decayed teeth, 8.51% (89) filled teeth, and 6.12% (64) missing teeth. In the 12-year-old group, the component of DMFT was 77% (222) decayed teeth, 5.2% (15) filled teeth, and 17.7% (51) missing teeth (Table 2). In the 12-year-old group, the component of decayed teeth in dft was 95.7% (67) and component of filled teeth was 4.3% (3) (Table 3).

From among 1113 subjects 92.8% (1033) had no fluorosis, 3.2% (36) had questionable fluorosis, 3.7% (41) had very mild fluorosis, and 0.3% (3) had mild fluorosis. In the 5-year-old group, 94.8% (549) had no fluorosis while 2.93 % (17) had questionable fluorosis. In the 12-year-old group, 90.63% (484) had no fluorosis, while 5.58 % (30) had very mild fluorosis. There was no significant statistical association of dental fluorosis with age in both age groups ($p > 0.05$).

Discussion

Dental caries is a common dental 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 (W.H.O) has ranked it as number three among all chronic non-communicable diseases that require worldwide attention for prevention and treatment (11). Moreover, decayed teeth are particularly harmful to children's growth and development, and can severely jeopardize their health. Therefore, it is advocated that ef-

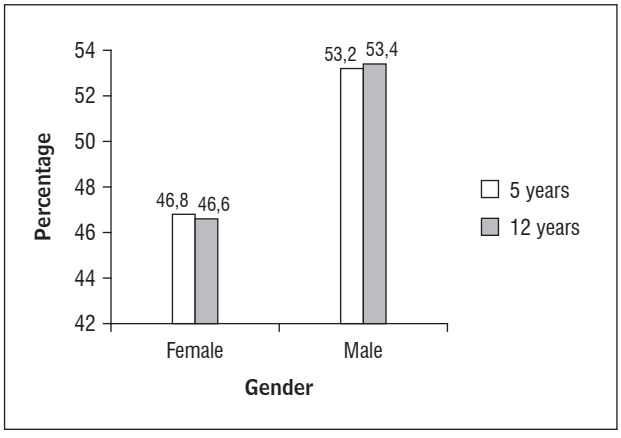

Figure 1 - Distribution of study population according to age and gender

Source: Research data.

Table 1 - Prevalence of dental caries according to age

Age (Years)		N*	Caries prevalence N (%)
5	Boys	308	130 (42.2)
	Girls	271	150 (55.3)
	Total	579	280 (48.3)
12	Boys	285	91 (31.9)
	Girls	249	72 (28.9)
	Total	534	163 (30.5)

Source: Research data.

Legend: N* = Number of subjects; Boys v/s girls in 5 yr age, $p < 0.05$; in 12 yr age, $p > 0.05$. Overall, 5 and 12 yr age, $p < 0.05$.

Table 2 - Components of dmft according to age

Age (years)	N	Decayed teeth		Filled teeth		Missing teeth		Total d+m+f/ D+M+F	Mean (S.D.)
		%	n	%	n	%	n		
5*	579	85.3	892	8.51	89	6.12	64	1045	1.8 ± 2.1
12**	534	77	222	5.2	15	17.7	51	288	0.5 ± 0.6

Source: Research data.

Legend: * = dmft in 5 years; ** = DMFT in 12 years; n = number of teeth; S.D. = standard deviation.

Table 3 - Prevalence of dental caries according to age

Age (years)	N*	Decayed teeth		Filled Teeth		Total dft
		%	n*	%	n*	
12	534	95.7	67	4.28	3	70

Source: Research data.

Legend: N* = Number of subjects; n* = number of teeth.

forts to improve the overall situation are still highly indicated (12).

The present study was a cross-sectional study carried out to assess the prevalence of dental caries among 5 and 12-year-old schoolchildren in Chandigarh (U.T.) India. A total of 1113 school children were examined.

It has been found that more than one third of the subjects had body mass index lower than normal, which could be because of the growing age. However, further nutritional assessment is required for such groups to identify any deficiencies.

In the present study, prevalence of dental caries was higher in the 5-year-old group than in the 12-year-old group (48.3 % and 30.52 %, respectively), which is similar to the reports of some other studies (13-16). This could be attributed to the fact that permanent teeth have a lower susceptibility to dental caries. It may also be because children of 12 years of age had just finished to change dentition. It could also be due to the lower calcium content of deciduous teeth and structural differences that may increase caries susceptibility in deciduous teeth (16). However, a cross-sectional study conducted in Brazil reported a much higher prevalence of dental caries (86.8%) in 12-year-old group as compared to the present study (17).

The prevalence of dental caries was higher in males as compared to females in 5-year-old children in the present study and some other study (14) whereas in 12-year-old children, prevalence of caries was found more in females in the present study, which is contradictory to the results of the study mentioned (14). There was significant difference in the prevalence of dental caries between males and females in both age groups and this was in agreement with the findings of Sathanathan et al. (13).

The mean dmft score was 1.80 in 5-year-old group and mean DMFT score was 0.53 in 12-year-old group, which was found to decrease with age in this study and in a different study conducted in another part of India (15). However, in a cross-sectional study conducted in Mexico in 2006, caries experience was found to increase with age in both age groups (18).

Males had higher mean dmft and mean DMFT score (1.90 and 0.58, respectively) as compared to their females counterparts, which is contrary to that reported by some other authors (14, 15). Although mean dft score of 12-year-old group was higher in females than in males, it was not statistically significant.

In the 5-year-old group, fluorosis prevalence was 5.17% and in the 12-year-old it was 9.32%, which was lower in comparison to the studies conducted in western and southern parts of India (19, 20) and prevalence was higher as compared to study reports carried out by other authors (21). However, concerning the 5-year-old group of children, only 1.89% had very mild fluorosis as compared to 5.58% of children of 12 years of age.

Problems were faced while calculating the **M** and **m** component of DMFT/dmft as it is recognized drawback of the index and limitation of the study.

Conclusion and recommendations

According to the oral health goal advocated by the W.H.O. 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 (22). In the present study, it was observed that 51.7% of the 5-year subjects were caries free and the mean DMFT was 0.53 at 12 years of age. Hence, it may be concluded that W.H.O. global oral health goals for 5 and 12 year olds are achieved in Chandigarh. Still, as public health people we have to aim at achieving '0' (zero) DMFT for all school going children.

Based on the results obtained from the study, following recommendations are drawn:

i. Regular school dental health education and training camps should be conducted in all schools to screen, treat and educate schoolchildren, teachers and parents;
ii. These trained and motivated school teachers can further be made responsible for implementing these programs in the schools on a regular basis;

iii. Regular oral health screening should be made mandatory along with general medical check-up;
iv. Systematic community-oriented oral health promotion programmes are needed to target lifestyles and the needs of children;
v. Support and encouragement should be given to organize preventive school dental health programmes;
vi. Weekly/fortnightly fluoride mouth rinse programs should be made an integral part of each government as well as private school of Chandigarh.

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