Original Research Article

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A study on the prevalence of dental caries among the school-going children in Tamil Nadu

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ABSTRACT

Background: Dental caries is an important social problem in India and is predominantly a disease of childhood. The prevalence and incidence of dental caries is influenced by various socio-demographic factors like age, sex, ethnic groups, dietary patterns and oral hygiene habits. The objective of the study were to estimate the prevalence of dental caries among the school going children aged between 5–10 years and to determine the risk factors associated with dental caries.

Methods: A population based cross–sectional study was conducted among the primary school going children in Thirumazhisai from February 2016 to July 2016. Simple random sampling technique was employed and 357 children were identified for the study. Descriptive statistics was calculated for background variables and association between the risk factors and evidence of dental caries was analyzed by tests of proportions and chi square test was used as a statistical test of significance.

Results: The overall prevalence of dental caries was found to be 63.9%. Higher prevalence of dental caries was found among the girls (54%), among the lower socioeconomic class (41.7%), among those who consumed mixed diet (74.8%), among those who consumed junk foods (62.6%) at least once every day and among those who consumed dairy products (58.9%) at least once every day. Dental caries was found to be low in prevalence among those who consumed fruits several times a week (6.1%), among those who brushed their teeth twice/more than twice a day (20.2%) and among those who washed their mouth after each meal (38.7%).

Conclusions: Lack of awareness, improper dietary habits and poor oral hygienic practices are seemingly the contributing factors for the development of dental caries. Dental caries is a preventable disease which can be alleviated by creating community awareness through health education activities.

Keywords: Dental caries, Prevalence, School going children, Oral hygiene practices

INTRODUCTION

Oral health is integral to general health and essential for well-being and oral diseases qualify as major public health problems owing to their high prevalence and incidence. The public health problems associated with oral disease are a serious burden on countries around the

globe.² The World Health Organization (WHO) has ranked dental caries, as number three among all chronic non–communicable diseases that require worldwide attention for prevention and treatment.³

Dental caries has high prevalence all around the world involving the people of all region and society.⁴ In the

developing countries like India the prevalence of dental carries is very high particularly among the children and adolescents.⁵

Dental caries is an important social problem in India and is predominantly a disease of childhood. The prevalence and incidence of dental caries is influenced by various socio—demographic factors like age, sex, ethnic groups, dietary patterns and oral hygiene habits. Literature from different parts of India shows that there is an increase in the prevalence of dental caries among the school-going children.

Children in the age group between 5–10 years is of interest in relation to caries levels in the primary dentition, which may exhibit changes over a shorter time span than in the permanent dentition at other index ages.² School age is an influential stage in people's lives, a time when lifelong sustainable health related behaviors, as well as beliefs and attitudes, are being developed.⁸

Thus, the present study was designed to assess the prevalence and associated risk factors for dental caries among the school going children aged between 5–10 years in an urban area in Tamil Nadu and also enable to plan appropriate preventive measures.

METHODS

Study design

This study was done as population based cross – sectional study on the prevalence of dental caries among the primary school children aged between 5–10 years in the two government schools in Thirumazhisai, urban field practice area of Department of Community Medicine, Saveetha Medical College, Thandalam from February 2016 to July 2016.

Sample size

Based on the study conducted by Dhar et al in Rajasthan with the prevalence of dental caries among the school going children aged between 6–10 years of 63.2%, absolute precision 5%, at 95% confidence level, the minimum sample size required for the study was estimated to be 357 participants.⁴

Sampling technique

There are three government schools in Thirumazhisai out of which only two schools have the primary section. Hence the sampling frame was made enlisting all the children aged between 5–10 years from the two schools. There were a total of 509 students from the two schools and out of which 357 children were identified for the study using simple random sampling technique. Consent was obtained from the school principal before the commencement of this study.

Inclusion criteria

Study subjects aged between 5–10 years who were willing and were present on the day of the oral examination were included in the study.

Exclusion criteria

Subjects who were not willing to participate, those who were absent on the day examination, on whom the oral examination could not be conducted were excluded.

Study tool

Study tool was interview schedule solicited information on socio-demographic profile, dietary habits, oral health problems and oral hygienic practices of the study subjects. Data was collected by means of personal interviews using a structured questionnaire. Investigators were given intensive training and calibration for a week in a dental teaching institution prior to the start of the study for assessment of dental caries based on WHO guidelines.

Data collection

Prior to the start of the study, official permission was obtained from the Directorate of Education, Poonamalle and the local authorities. The school principals were informed about the details of the study and were invited to participate in the study. After obtaining consent from the principal, an oral consent was taken from each subject in the presence of the class teacher for participating in the study.

The children were interviewed and examined in their respective schools. The participants were made to sit on a chair/bench in natural daylight. The children were asked to rinse mouth thoroughly with water before examination, then the teeth were dried with cotton swab and the dental caries were recorded. Oral examinations were conducted using a disposable illuminated mouth mirror and CPI probe according to World Health Organization (WHO) diagnostic criteria.²

Clinical examination of the oral cavity was done to screen for dental caries using DFT criteria. Only definite cavitations of the tooth surface were recorded as dental caries. DFT criteria were employed instead of DMFT criteria because the study population includes children aged between 5–10 years.² The missing teeth are ignored in this age group, because it is difficult to assess whether the missing tooth was exfoliated or extracted due to caries or due to serial extraction. Survey findings were reported to respective school authorities and referral to appropriate facility was recommended. A referral was forwarded to the parents of the children in need of dental care. On completion of the survey, an oral health education session was conducted and correct way of brushing the teeth was demonstrated in each classroom.

Data analysis

Data entry and analysis was done using the statistical package SPSS 16 version. Descriptive statistics was calculated for background variables of 357 children. In the present study DFT criterion was employed instead of DMFT criteria because the study population includes children aged between 5–10 years. The missing teeth were ignored in this age group, because it is difficult to assess whether the missing tooth was exfoliated or extracted due to caries or due to serial extraction. Hence for analysis the children with missing teeth (n=102) were excluded and the remaining 255 study participants were included to estimate the proportion of children with dental caries and for the analysis of association between socio-demographic factors, dietary patterns, oral hygienic

practices and the evidence of dental caries; chi square test was used as the test of significance.

Ethical approval

Ethical clearance was obtained from the institutional Ethics Committee, Saveetha University (SRB reference No: 11/07/2016/IEC/SU) prior to the conduct of the study.

RESULTS

The study included 357 school going children aged between 5–10 years from the two Government schools situated in Thirumazhisai, urban field practice area of Saveetha Medical College, Thandalam.

Table 1: Demographic details of the study subjects (N=357).

S. No	Characteristics	N	Percentage (%)
1	Age (in years)		
	5–7	154	43.1
	8–10	203	56.9
2	Gender		
	Male	172	48.2
	Female	185	51.8
3	Religion		
	Hindu	293	82.1
	Christian	44	12.3
	Muslim	20	5.6
4	Socioeconomic status (modified Kuppusamy classification)		
	Upper middle class	43	12.1
	Lower middle class	63	17.6
	Upper lower class	95	26.6
	Lower class	156	43.7

Table 2: Details about the dietary practices of the study subjects (N=357).

S. No	Characteristics	N	Percentage (%)
II	Dietary practices		
5	Diet habits		
	Mixed diet	258	72.3
	Vegetarian	99	27.7
6	Frequency of intake of fruits		
	Everyday	117	32.8
	Once in a week	221	61.9
	Several times in a week	19	5.3
7	Frequency of intake of junk foods		
	Everyday	179	50.1
	Once in a week	23	6.4
	Several times in a week	155	43.4
8	Frequency of intake of dairy products/chocolates/sweets		
	Everyday	215	60.2
	Once in a week	66	18.5
	Several times in a week	76	21.3

S. No	Characteristics	N	Percentage (%)
III	Oral hygiene practices		(%)
9	Use of toothbrush		
	Yes	338	94.7
	No (finger/neem stick)	19	5.3
10	Use of toothpaste		
	Yes	338	94.7
	No (charcoal/brick powder)	19	5.3
11	Frequency of brushing the teeth		
	Once a day	235	65.8
	Twice/more than twice a day	122	34.2
12	Frequency of washing the mouth		
	After each meal	193	54.1
	Irregularly (not after each meal)	164	45.9

Table 3: Details about the oral hygienic practices of the study subjects (N=357).

In this study, it was found that among the 357 students, 154 (43.1%) of them belonged to the age group between 5–7 years and 203 (56.9%) of them belonged to the age between 8–10 years. Mean age of the study participants were 7.99 years with a standard deviation of 1.427 years. The demographic details of the study subjects given in Table 1.

With reference to diet habits, it was found that 258 (72.3%) students consumed mixed diet while 99 (27.7%) students consumed vegetarian diet. The details about the dietary practices of the study subjects are given in Table 2. Oral hygienic practices like brushing the teeth and washing the mouth were practiced among the study subjects. The details of oral hygienic practices of the study subjects are given in Table 3.

In the present study, it was found that toothache 73 (20.4%), bleeding from the gums 35 (9.8%), pain in the gums 22 (6.2%) were the problems experienced by the study participants in the past six months while 98 (27.5%) reported that were not aware of the any problem in the oral cavity and 129 (36.1%) of them reported that they did not experience any problem and of the oral cavity (Figure 1: Problems of the oral cavity among the study subjects).

In the present study DFT criteria was employed instead of DMFT criteria because the study population includes children aged between 5–10 years. The missing teeth were ignored in this age group, because it is difficult to assess whether the missing tooth was exfoliated or extracted due to caries or due to serial extraction. Hence for analysis the children with missing teeth (n=102) were excluded. Therefore, on clinical examination of the oral cavity of the 255 study participants, the prevalence of dental caries (decayed teeth (n=141) and filled teeth (n=22)) was found in 163 (63.9%) students and caries free teeth was found in 92 (36.1%) (Figure 2).

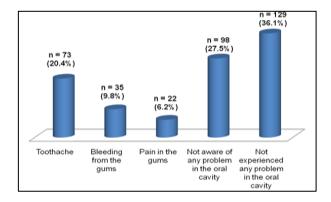


Figure 1: Problems of the oral cavity among the study subjects (n=357).

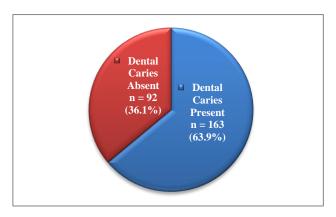


Figure 2: Prevalence of dental caries among the study subjects (n=255).

There is a significant association between socioeconomic status, consumption of junk foods/dairy products/chocolates oral hygienic practices like brushing the teeth twice a day and rinsing the mouth after every meal and the presence of dental caries. The details about the association between the risk factors and dental caries are given below in Table 4.

Table 4: Association between the risk factors and dental caries (N=255).

S No	Factors Demographic factors	Dental caries present (n=163)		Dental caries absent (n=92)		χ² value	P value
I		N	(%)	N	(%)		
1	Age (in years)						
	5 – 7	54	33.1	29	31.5	0.069	0.793
	8 – 10	109	66.9	63	68.5	0.009	0.793
2	Gender						
	Male	75	46.0	53	57.6	3.163	0.075
	Female	88	54.0	39	42.4	3.103	0.075
3	Religion						
	Hindu	123	75.5	75	81.5		
	Christian	31	19.0	10	10.9	3.115	0.211
	Muslim	9	5.5	7	7.6		
4	Socio economic status						
	Upper middle class	8	4.9	21	22.8		0.000
	Lower middle class	34	20.9	27	29.3	24.805	
	Upper lower class	53	32.5	18	19.6	24.803	
	Lower class	68	41.7	26	28.3		
II	Dietary practices	N	(%)	N	(%)		
5	Diet pattern						
	Mixed diet	122	74.8	62	67.4	1 627	0.202
	Vegetarian	41	25.2	30	32.6	1.627	0.202
6	Frequency of intake of fruits						
	Once everyday	53	32.5	35	38.0		0.298
	Once in a week	100	61.3	48	52.2	2.424	
	Several times in a week	10	6.2	9	9.8		
7	Frequency of intake of junk foods						
	Once everyday	102	62.6	26	28.2		
	Once in a week	10	6.1	9	9.8	27.906	0.000
	Several times in a week	51	31.3	57	62.0		
8	Frequency of intake of dairy products/chocolates/sweets						
	Everyday	96	58.9	62	67.4		
	Once in a week	15	9.2	18	19.6	13.898	0.001
	Several times in a week	52	31.9	12	13.0		
III	Oral hygiene practices	N	(%)	N	(%)		
9	Frequency of brushing the teeth						
	Once a day	130	79.8	26	28.3	CE CEE	0.000
	Twice/more per day	33	20.2	66	71.7	65.655	
10	Frequency of washing the mouth						
	After each meal	63	38.7	57	62.0	10.000	0.000
	Irregularly (not after each meal)	100	61.3	35	38.0	12.822	

DISCUSSION

Dental caries is one of the leading problems in school going children as well as in adults. The World Health Organization (WHO) has recognized dental caries as a pandemic and reported its prevalence among school children to range from 60–90%.

Age

In this study, the overall prevalence of dental caries among the school going children aged between 5-10

years was found to be 63.9% which is in concordance with the study by Karunakaran et al which was conducted among children aged between 4–6 years in which the prevalence of dental caries was 65.9%. Dhar et al, in their study among children aged between 6–10 years reported the prevalence of dental caries to be 63.2% and Garkoti et al in their study which was conducted among the school children aged between 5–13 years found that the prevalence of dental caries was 58.18% while Joshi et al in their study among the children of 6–12 years of age found that the prevalence caries was 77%. Alli, Bansal et al in their study among school children 5–18 years of age, prevalence of dental caries was found to be 30.9% which

is far below the prevalence in the present study and Shailee et al found the prevalence of dental caries at 12 years was 32.6% and at the age of 15 years it was 42.2% while Navin et al reported the prevalence of dental caries among the school going children aged between 12–15 years was reported to be as 51.9% and this discrepancy can be attributed to different age groups. 13-15

In this study, prevalence of dental caries among the children 8-10 years was 66.9% was higher than the prevalence of dental caries among children 5-7 years was 33.1% but this difference is not significant. This shows that as the age advances the prevalence of dental caries escalates. Higher DMFT was found in the age group of 8-10 years (49.23%) than age group of 5-7 years (18.62) and this could be explained on the basis of increased exposure of the teeth to poor oral hygiene conditions. Mahesh et al in their study found that among the children aged 5 years (boys DMFT was 3.53±3.07, girls was 3.49±2.83) while among the children aged 12 years the DMFT for boys was 3.80±3.43, girls 4.11±2.98 and hence the caries prevalence of 12 years age group was higher as compared to the 5 years age group in both sexes.16

Gender

The prevalence of caries teeth was found to higher among females (54%) than among males (46%) in the present study and this difference was not significant. Similarly, Datta et al in their study in Sundarban found that the prevalence of dental caries was higher in girls (76%) than in boys (68.8%).5 This can be attributed to the fact that early teeth eruption in girls in comparison to boys. However Dixit et al in their study reported that the overall prevalence of dental caries was higher among boys (55%) than girls (44%) and Dhar et al, in their study reported that caries prevalence in the boys group was 66.91% (DMFT 2.82±2.01) while that of girls group was 59.03% (DMFT 2.37±2.05). 4,18 Garkoti et al in their study found that the prevalence of dental caries was higher in boys (60%) than in girls (56%) and Joshi et al in their study reported a higher prevalence among boys (80%) than in girls (73%) while Karunakaran et al in their study among children aged between 4-6 years reported that the prevalence of dental caries was 69.57% among boys and 61.5% among girls. 10-12 Mittal et al found that, among the 5 year group prevalence of dental caries was 69.4% in males and 67.62% in females and among the 12 year age group, caries prevalence of caries was 41% in males and 33% in females. 19 Contrastingly a study by Rajesh et al the prevalence of dental caries was found to be almost equal among the female (34%) and male (31.8%) students and Ahmed et al reported that there was no difference in the prevalence of dental caries between males (30.7%) and females (31%) and this discrepancy can be attributed to different age groups. 13,20

Socio-economic status

In the present study the prevalence of dental caries was found to be higher among the lower class (41.7%) and

among the upper lower class (32.5%) than among the lower middle class (20.9%) and upper middle class (4.9%) and this difference is highly significant. Sudha et al in their work reported that the prevalence of caries in the low socio-economic group was higher (96.2%) than the high socio-economic group (77.1%) while Datta et al among the school children in Sundarban found that 84.2% of the students belonging to the less income group had dental caries in comparison to 59.65% students in higher income group and this difference is statistically significant.^{5,7} Mulu et al reported that children belonging to the lowest income group (26.3%) had the highest proportion of dental caries but the highest income group (24%) had higher prevalence than the middle income group (11.9%).²¹ Contrastingly Elhadi et al in their study in Sudan among the kindergarten students, found that there is no significant difference in the prevalence of caries between the high (65.5%) and low (64.0%) socio economic status.²²

Dietary habits

This study showed that those who consumed mixed diet (74.8%) had higher prevalence of dental caries than those who consumed vegetarian diet (25.2%), the difference was not significant. Rajesh et al, in their study reported that 37.9% of those who consumed mixed diet while 25.4% of those who consumed vegetarian diet developed dental caries. Abdul et al in their study found that the prevalence of dental caries was higher among those who consumed vegetarian diet 85.57% than among those who consumed mixed diet and this difference is because of the fact the population in this region are totally vegetarians due to religious reasons. 17

Consumption of fruits, junk foods, dairy products/ chocolates/sweets

Lower prevalence of dental caries was found among children who consumed fruits several times in a week (6.1%) than children who consumed fruits once in a week (61.3%) and this difference is not significant (p=0.298). The prevalence of dental caries was found to high among those who consumed junk foods at least once every day (62.6%) than those who consumed it once in a week (6.1%) and this difference is highly significant (p=0.000). Consumption of dairy products/chocolates/sweets at least once every day (58.9%) had higher prevalence of dental caries than those who consumed it once in a week (9.2%) and this difference is highly significant (p=0.001).

Consuming fruits several times in a week, reflects the healthy eating habits and the awareness on dental health and presumably good oral hygienic habits and hence lower prevalence of caries tooth while consumption of junk foods and chocolates reflects on unhealthy eating and oral hygienic practices and hence higher prevalence of caries tooth. Dental caries is a process due to formation of acid by fermentation of sugar through acidogenic bacteria that lead to decalcification of dental enamel. Rajesh et al in their study reported that 34.2% of the students who consumed chocolate while 14.3% of

them who did not consume chocolate developed dental caries and this difference is statistically significant.²⁰

Malvania et al in their study, found that those who consumed liquid cariogenic food like sugared tea, soft drinks several times a day had 2.17 (OR–2.170, 95% CI 0.810–5.814) times more risk of developing dental caries as opposed to those consumed liquid cariogenic food once a day/once a week/occasionally but this risk difference was not significant.²³ Among those who consumed solid cariogenic food like sweets, dairy products, chocolates several times a day had 2.498 (OR–2.498, 95% CI 1.469–4.249) times more risk of developing dental caries as opposed to those consumed liquid cariogenic food once a day/once a week/occasionally and this risk difference was significant.²³

Dawani et al in their work reported that children who did not consume flavored sweetened milk had 0.838 times less chances of dental decay than those who consumed flavored sweetened milk (p<0.014, RR=0.838, 95% CI 0.032–0.330) and for consumption of confectionaries (p<0.274, RR=0.880, 95% CI 0.699–1.107).²⁴

Oral hygienic practices

Brushing the teeth

In this study oral hygienic practices like brushing the teeth among the study participants was practiced and it was found that 235 (65.8%) participants brushed their teeth once a day while 122 (34.2%) participants brushed their teeth about twice/more than twice a day. Prabhakar et al in their study reported that a total of 2708 (60.3%) study subjects brushed their teeth once daily and 1785 (39.7%) brushed their teeth twice daily and Harikiran et al in their work reported that 58.9% of the subjects brushed their teeth once a day, while 38.5% of them brushed their teeth about two or more times a day and 2.6% irregularly.^{25,26} Dixit et al in their work found that 56% of the children brushed their teeth daily and among them only 24% of them brushed their teeth twice a day. Datta et al reported that 68.4% of the students brushed their teeth once daily while 16.67% of the students had the habit of brushing more than once daily and 14.91% students did not have the habit of brushing every day.⁵

With reference to oral hygienic practices like brushing the teeth, it was found that those who brushed their teeth about twice/more than twice a day (20.2%) had lower prevalence of dental caries than those who brushed their teeth once a day (79.8%) and this difference is highly significant (p=0.000) and this is in concordance with Shailee et al in their study reported that among the 12 years old children, those who brushed their teeth once a day had higher mean DMFT (0.743) than those who brushed twice a day (0.4859) this difference was statistically significant.¹⁴

Malvania et al found that those who brushed their teeth once a day had 9.407 (OR-9.407, 95% CI 4.711-18.784)

times more risk of developing dental caries than those who brushed the teeth twice a day and this risk difference was significant.²³ Datta et al reported that the prevalence of dental caries was lower (47.4%) among those who brushed twice a day than those who brushed their teeth once daily or not daily (76.84%) and this difference is statistically significant.⁵ Mulu et al in their study reported that children who did not clean their teeth were 2.6 times more likely to have caries than those who cleaned (AOR=2.6, 95% CI=1.08–6.2). Children who had cleaned their teeth revealed a lower prevalence (84%) of dental caries.²¹

Rinsing the mouth

Oral hygienic practices like rinsing the mouth was practiced among the study participants and it was found that 193 (54.1%) students washed their mouth washed their mouth after each meal while 164 (45.9%) students irregularly washed their mouth not after each meal. Dixit et al in their work found that 80% of the children rinse their mouth with water after meals. ¹⁸ Datta et al reported that with regard to the habit of washing mouth after taking food, it was found that 67.8% had the habit of washing their mouth rarely while 22.8% of them often washed their mouth after taking food and 11.4% of them washed their mouth always after taking any meal. ⁵

The prevalence of dental caries was found to be low among those who washed their mouth after each meal (38.7%) than those who washed their mouth irregularly (not after each meal) (61.3%) and this difference is highly significant (p=0.000). Datta et al reported that the prevalence of dental caries was lower (56.41%) among those who had the habit of washing the mouth after every meal/most of the time than those who rarely washed their mouth after taking food (80%) and this difference is again statistically significant.⁵

CONCLUSION

Dental caries is a common public health problem among primary school children. Improper dietary habits, poor oral hygienic practices like decreased frequency of brushing the teeth and washing of mouth, lack of knowledge on the importance of dental health are seemingly the contributing factors for the development of dental caries. Dental caries is a preventable disease and the magnitude of the problem can be alleviated by creating awareness on oral health to the parents, teachers, general public and emphasis should be laid on oral hygienic practices and diet counseling. It is necessary to impart IEC activities on the importance of oral health by incorporating practical sessions on appropriate technique and frequency of brushing and cleaning the mouth to the school children.

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Ethical approval: The study was approved by the

Institutional Ethics Committee

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