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Original Article

Dentistry Section

Prevalence, Severity and Associated Factors of Dental Caries in 3-6 Year Old Children

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ABSTRACT

Objectives: To determine the prevalence and the severity of dental caries in 3-6 year old children in Chennai and to elucidate the factors which affect the dental caries in 3-6 year old children.

Methods: This study was a cross-sectional survey which was done on 527 children who were in the age group of 3 to 6 years, who were from 6 private and 6 corporation schools in Chennai, India. Two instruments were developed, pre–tested and validated for the study. One questionnaire which contained the various risk factors which had to be measured and the dental caries indices were used on children to collect the relevant data. A separate questionnaire was distributed to the parents to measure the socio economic status and to know the parents' educational levels.

Results: The prevalence of dental caries was found to be 63.4% in the study samples. The association between dental caries and the associated factors was determined by calculating the Odd`s ratio. Logistic regression was performed to test the magnitude of the association between dental caries and the factors which were associated with it, and linear regression was done for the continuous variables. There was a statistically significant high association between the oral hygiene practice, the eating habits of the children, the economic status and the parents' literacy levels and the caries prevalence in this study.

Conclusion: This study showed that preventive efforts should be focused on young children, as the benefits are cumulative. The oral health promotion should particularly be targeted to the areas of need, to redress the inequalities.

Key words: Dental caries, Pre-school children, Socio-economic status

INTRODUCTION

Dental caries (decay) is one of the most prevalent chronic childhood diseases worldwide and it is a major problem, both from a population health perspective and for the individual families who have to deal with young children who suffer from toothaches [1]. Once it occurs, its manifestation persists throughout life, even after the lesion is treated. Dental caries is increasing in India and it is important that steps be taken to curb this trend, because this may lead to crippling consequences on the functional component of the oral cavity [2].

Assessing the caries risk is important for all the patients and the process has to be repeated at intervals. It must be appreciated that a primary prevention will be required in all the children, to maintain a low caries risk status [3]. The preschool period is the time when deleterious oral habits, the caries patterns and the risk factors are being established. It is the ideal time to intervene and establish a healthy trend which can have a lifelong influence [4]. The detection and the prevention of early dental caries is very necessary, because the recent clinical studies have confirmed that the presence of early dental caries is one of the most accurate measures which can predict the children whoc are at a risk for future tooth decay.

Thus, updating the information on the disease patterns all over the country, its exact nature, and the degree of severity and understanding its association with the specific factors in kindergarten school children, are required for a better understanding of the current situation and for planning community caries prevention programmes.

Objectives

1. To determine the prevalence and the severity of dental caries in 3-6 year old children in Chennai city.
2. To elucidate the factors which affect the dental caries in 3-6 year old children.

MATERIAL AND METHODS

A cross-sectional study was done to measure the prevalence and the severity of dental caries in 3-6 year old children and to study the association of dental caries with the factors such as age, the oral health practices, the eating habits, the socio-economic status and the parents' educational levels. A list of the private primary schools in Chennai city was obtained; out of the 230 schools, six schools was selected by using a systematic random sampling technique. The children were selected from private and corporation schools to ensure adequate representation from all the socio economic strata. 527 children were enrolled by using a simple random sampling technique from the six selected private schools and from six corporation and balwadi schools in Chennai city, India.

Two questionnaires were developed for the study and they were pre-tested and validated. One questionnaire which contained the various risk factors which had to be measured and the dental caries indices were used on the children to collect the relevant data. Various risk factors were obtained from the existing literature. The feasibility of measuring these risk factors in our population was assessed.

A separate questionnaire was distributed to the parents, to measure the socioeconomic status and to know the parents' educational levels. A pilot study was done by using the questionnaire, to test its effectiveness in the field.

Approval was obtained from the concerned school authorities prior to the start of the survey.

THE DATA MANAGEMENT AND ANALYSIS

The Chi-square test was done for the comparison of the categorical variables and the 't'–test was done for the comparison of the continuous variables between the two groups. The 'f'–test was used for more than two groups. The association between dental caries and the associated factors was determined by calculating the Odd`s ratio. Logistic regression was performed to test the magnitude of the association between dental caries and the factors which were associated with it, and linear regression was done for the continuous variables.

RESULTS

Prevalence: The prevalence of dental caries was found to be 63.4% in the study samples. The prevalence of caries in 3 year old children was 44.3%, in 4 year olds, it was 57.8%, in 5 year olds, it was 72.0% and in 6 year olds, it was 74.1%.

Severity: [Table/Fig-1] shows that 34% of the children had no caries, that 23.5% had very mild caries, that 28.8% had mild caries, that 10.2% had moderate caries and that only 3.5% of the children had severe caries. It is observed that private schools had the less decayed and the missing component and a more filled component as compared to the corporation schools. The decayed, missing and the dmft scores were seen to increase with age. Boys and girls had almost similar dmft scores.

Dental Caries and the associated factors: The Oral Hygiene **Practices and Dental Caries:** There was a statistically significant difference between the mode of cleaning and the prevalence of caries. (X_2 = 4.303, p= .038). It was inferred that the children who used fingers for brushing were at a 1.89 times of developing dental caries as compared to children who used brushes for cleaning their teeth (OR = 1.89 95% CI = 1.03- 3.49) [Table/Fig-2].

The Eating Habits and Dental Caries: The odds of getting caries was 4.8 times higher in the children who ate more sweets than in the children who ate one or no sweets. (OR = 4. 762, 95% CI = 3.052 – 7.429) [Table/Fig-3].

The Socio economic status and Dental Caries: In comparing the children of a low socio economic status (SES) with the children of middle and high socio economicstatuses, the low SES children were found to be at a 3.4 times higher risk of developing caries. The prevalence of caries in the children ofthe low SES was 77.6%, whereas the caries prevalence was only 50.5% in the children of the middle and high SES [Table/Fig-4].

The Literacy level and Dental Caries: In the association between the literacy level and the caries prevalence, it was inferred that the children whose parents had higher literacy levels had a lesser caries prevalence. It was also found that the odds of developing dental caries was 3.6 times higher in the children whose mothers were not well educated as compared to that in the children of educated mother. The severity of dental caries was also found to be high in the children of not well educated mothers (dmft, dmfs = 2.01, 3.77 respectively.) This was found to be statistically significant (dmft t = 5.185 p = .0001, dmfs t = 7.478 p = .0001) [Table/Fig-5].

Factors	Total	Dental Caries				dmft		dmfs	
		Present		Absent		Mean	SD	Mean	SD
		No	%	No	%				
Mode of cleaning									
Finger	61	46	75.4	15	24.6	2.08	1.96	3.64	3.95
Brush	466	288	61.8	178	38.2	1.54	1.65	2.44	3.27
		OR= 1.89 95% CI 1.03- 3.49				t= 2.35 p=0.019		t=2.61 p=0.009	

[Table/Fig-1]: Risk assessment between caries status and oral hygiene practices

Factors	Total	Dental Caries				dmft		dmfs	
		Present		Absent		Mean	SD	Mean	SD
		No	%	No	%				
No. of sweets taken									
More than once	186	156	83.9	30	16.1	2.60	1.87	4.38	3.98
Nil or once	341	178	52.2	163	47.8	1.06	1.31	1.60	2.51
		OR = 4.762 95% CI = 3.052 – 7.429				t= 11.008 p= .0001		t= 9.782 p= .0001	

[Table/Fig-2]: Risk assessment between caries status and no. of sweets taken

Factors	Total	Dental Caries				dmft		dmfs	
		Present		Absent		Mean	SD	Mean	SD
		No	%	No	%				
Socio economic status									
Low	223	173	77.6	50	22.4	1.99	1.79	3.71	4.13
Middle and high	279	141	50.5	138	49.5	1.28	1.59	1.72	2.43
		OR = 4.762 95% CI = 3.052 – 7.429				t= 11.008 p= .0001		t= 9.782 p= .0001	

[Table/Fig-3]: Risk assessment between caries status and Socio economic status

Factors	Total	Dental Caries				dmft		dmfs	
		Present		Absent		Mean	SD	Mean	SD
		No	%	No	%				
Mothers Educational level									
Up to High school	234	182	77.8	52	22.2	2.01	1.81	3.77	4.15
Higher secondary and above	268	132	49.3	136	50.7	1.23	1.55	1.59	2.22
		OR = 3.606 95% CI = 2.441 – 5.328				t= 5.185 p = .0001		t = 7.478 p = .0001	

[Table/Fig-4]: Risk assessment between caries status and mothers educational level

It was also inferred that the children of the fathers with less than a high school education were at a 3.6 times higher risk of developing dental caries as compared to the children of the fathers who had more than a high school education. There was a highly statistically significant association between the two groups and the severity of caries also (dmft t= 4.863, p = 0.001, dmfs t = 7.144, p = 0.001.) [Table/Fig-6].

Age and Dental caries: It can be inferred from the table, that with increasing age, there was an increase in the caries prevalence (X_2 for trend = 29.89, p= .0001). It was seen that the odds of getting caries was 1.73 times higher in 4 year old children, that it was 3.24 times higher in 5 year old children and that it was 3.6 times higher in 6 year old children. The dmft and the dmfs scores also showed increasing trends with increasing age. (dmft f= 4.206, p= .006, dmfs f= 3.694, p= .012) [Table/Fig-7].

The multivariate analysis results: Logistic regression was done for estimating the magnitude of the association between dental caries and the factors which affect dental caries. The variables of age, the number of sweets which were eaten per day, the socio economic statuses of the children, the educational levels of the mothers and the educational levels of the fathers were included in the model in a stepwise method. The number of sweets which were eaten per day, the educational levels of the mothers and age were taken up in the final model and they showed a statistical significance.

It was concluded that the children who ate more number of sweets per day were at a 5 times more risk of developing caries. (OR = 5.085, 95% CI = 3.15- 8.19). The odds of getting caries was 3 times more in the children whose mothers were not educated above high school (OR = 3.277, 95% CI = 2.138-5.025). The study also showed that with increasing age, the children were at a 1.3 times more risk of developing caries (OR = 1.376, 95% CI = 1.140-1.661) [Table/Fig-8].

Factors	Total	Dental Caries				dmft		dmfs	
		Present		Absent		Mean	SD	Mean	SD
		No	%	No	%				
Fathers Educational level									
Up to High school	224	175	78.1	49	21.9	2.00	1.80	3.77	4.14
Higher secondary and above	278	139	50	139	50	1.27	1.58	1.67	2.37
		OR = 3.571 95% CI = 2.407 – 5.299				t= 4.863 p = .0001		t = 7.144 p = .0001	

[Table/Fig-5]: Risk assessment between caries status and fathers educational level

Factors	Total	Dental Caries				OR	95%CI	dmft		dmfs	
		Present		Absent				Mean	SD	Mean	SD
		No	%	No	%						
Age											
3	122	54	44.3	68	55.7	1		1.16	1.49	1.81	2.84
4	102	59	57.8	43	42.2	1.73	0.98-3.05	1.54	1.85	2.39	3.56
5	168	121	72.0	47	27.9	3.24	1.93-5.46	1.77	1.70	2.83	3.41
6	135	100	74.1	35	25.9	3.60	2.06-6.38	1.83	1.69	3.11	3.55
		X_2 for trend = 29.89 p = .0001						f = 4.206 p = .006		f = 3.694 p = .012	

[Table/Fig-6]: Risk assessment between caries status and fathers educational level

Factor	β	SE(β)	p value	OR	95% CI
No. of sweets taken	1.626	.243	.001	5.085	3.15- 8.19
Mothers educational level	1.187	.218	0.001	3.277	2.138-5.025
Age	.319	.096	0.001	1.376	1.140-1.661

[Table/Fig-7]: Factors affecting Dental caries through multivariate logistic regression analysis

Factor	β	SE(β)	p value	OR	95% CI
No. of sweets taken	1.626	.243	.001	5.085	3.15- 8.19
Mothers educational level	1.187	.218	0.001	3.277	2.138-5.025
Age	.319	.096	0.001	1.376	1.140-1.661

[Table/Fig-8]: Factors affecting Dental caries through multivariate logistic regression analysis

DISCUSSION

Dental caries, which is essentially a product of affluence and civilization, now poses an alarming health risk in children. This study focused mainly on the dental caries statuses of the children who were in the age group of 3 - 6 years and it highlighted the high burden of the illness which was caused by caries. The results of this study were in general agreement with the previous works of several authors.

The main objective of this study was to find the prevalence, severity and the factors which were associated with dental caries. The prevalence of dental caries was found to be 63.4% in the study samples. This showed a high prevalence of the caries in 3-6 year old children, and it may be attributed to various risk factors.

As in other previous studies [5-8], the caries experience and the severity of caries were also found to increase with increasing age. This increasing trend may be partly due to the increased consumption of sugar containing food, the changes in the dietary habits and non use of proper oral hygiene measures. The caries experience in advanced age might also be due to more exposure of the teeth to the oral environment, as caries is a continuous and a cumulative process [9].

The children who used fingers to clean their teeth were found to have more severe dental caries as compared to the children who used brushes. This result was in accordance with the results of Retnakumari N [10]. This showed that fingers may not completely clean the grooves, fissures and the proximal areas of the teeth and that the teeth may be more susceptible to caries. The frequency of tooth brushing, that is brushing once daily or twice daily, revealed no significant association with the prevalence of dental caries in this study. These findings suggest that a prolonged participation of the parents in tooth cleaning is a necessary component in a preschool child's dental hygiene and that the quality of cleaning, rather than a mere cleaning twice daily, must be stressed. The tooth brushing of children who are under ten years of age is inefficient; this difficulty can be explained by the lack of motivation and the poor manual dexterity which are normal in this age group [11].

In studying the eating habits of children, it was observed that there was an increasing trend with the number of sweets which were

eaten per day and the prevalence of dental caries. This was in agreement with the results of Lehl G 2 Utreja D et al., [12] and Amit Arora et al., [13].

The present study showed that the economic status was one of the contributing factors in the development of dental caries. This socio economic status related trend has been reported in the studies which were done in many countries [7,14-16]. The socioeconomic status has been considered as a determinant factor in caries risk assessment studies. When it is considered at an individual level, the socioeconomic status is found to influence dental caries in several ways. A low family income may affect the food selection and the nutrient intake of the mothers and also their infants during the tooth development period. It may also affect the degree of education, the health values, the life-styles and the access to health care information. The differences in the decayed teeth, missing teeth and the filled teeth between the socioeconomic groups may be due to the benefit of the preventive measures, an early diagnosis and the specific treatment, which are affordable by the high economic group children than the middle and low economic group children. As a consequence, the family income can be a proxy indicator for the tooth susceptibility to caries [15].

The parents' literacy levels and the caries prevalence showed a high statistical association in the study. This was supported by results of Retnakumari N [10]. The parents with a better attitude and more knowledge will probably build up better oral health habits in their children and look after their childrens' oral health.

CONCLUSIONS

The results of this study showed a high prevalence of dental caries, which could further lead to complications and crippling, which could result in other health problems. It was also inferred from this study, that the prevalence of dental caries increased with age and that it was highly associated with the oral hygiene practices, the eating habits, the socioeconomic statuses and the parents' literacy levels. Therefore, the results of this study indicate that the preventive efforts which are being made, should be focused on young children, as the benefits are cumulative. The oral health promotion should particularly be targeted to the areas of need, to redress the inequalities. Nondental personnel such as primary care and education professionals may be employed, to pass on the oral health knowledge and to influence the choices of the defined target populations. Awareness and motivation should be built in the parents also.

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