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Early Childhood Caries and its Association with Socio-Behavioural and Parental Factors among 2-6 Year Old Children in Faridabad

By Dr. Pratibha Taneja, Dr. C M Marya, Dr. Ruchi Nagpal & Dr. Sakshi Kataria

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Results: Chi square tests were applied for evaluation of risk factors. The prevalence of ECC was found out to be 28.8%.

Conclusion: Presence of visible plaque, habit of breast feeding, bottle feeding, frequency and direction of cleaning was found to be the determinants of ECC.

Keywords: *early childhood caries (ECC), visible plaque, pre-schoolers.*

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I. Introduction

Dental caries is an epidemic disease affecting humans of all ages in regions of most common disease of children. Among all the dental diseases, the prevalence of dental caries in India is increasing and is referred to as "Disease of civilization."[1] According to Centre for Disease Control & Prevention dental caries is perhaps the most prevalent infectious disease.[2] Although it is well understood and preventable but still a global problem among children and young adults. More than 40% of children have caries by the time they reach kindergarten.[3]

Author α: Post-Graduation Student, Dept. of Public Health Dentistry, Sudha Rustagi College of Dental Sciences and Research, Faridabad, Haryana. e-mail: pratibhataneja3@gmail.com
Author σ: Prof. and Head, Dept. of Public Health Dentistry, Sudha Rustagi College of Dental Sciences and Research, Faridabad, Haryana. e-mail: maryacm@yahoo.co.uk
Author ρ: Reader, Dept. of Public Health Dentistry, Sudha Rustagi College of Dental Sciences and Research, Faridabad, Haryana. e-mail: drruchinagpal1975@gmail.com
Author ω: Senior Lecturer, Dept. of Public Health Dentistry, Sudha Rustagi College of Dental Sciences and Research, Faridabad, Haryana. e-mail: sakshikataria87@gmail.com

Early childhood caries (ECC) is a serious oral health problem. According to Academy of Pediatric Dentisrty (AAPD), Early Childhood Caries is defined as the presence of one or more decayed (non-cavitated or cavitated lesions), missing (due to caries) or filled tooth surfaces in any primary tooth in a child with 71 months of age or younger. It also has a complex etiology and is considered to be a multi-factorial disease and these factors includes a susceptible host, fermentable carbohydrate diet, presence of dental plaque, high number of cariogenic micro-organisms such as Mutans streptococci, lactobacillus and time factor.[4]

Early Childhood Caries can be a particularly virulent form of caries, beginning soon after tooth eruption, developing on smooth surfaces, progressing rapidly and having a lasting detrimental impact on the dentition.[4]

ECC has also been described as a social, political, behavioural, medical, psychological, economical and dental problem, because it is epidemic in disadvantaged children, regardless of race, ethnicity or culture. Long term follow up reveals that children who experience ECC are more likely to develop dental problems as they grow older and the prevalence rate ranging from 1% to 12% in pre-schoolers of developed countries9 and from 50% to 80% in high-risk groups.[6]

Studies have found that the frequency of ECC is greater among children who fall asleep sipping sugar containing fluid, children in families with a larger number of siblings and those whose mothers are younger.[6] ECC has also being associated with demographic characteristics, parental attitude, parents with low level of formal education or insufficient knowledge regarding oral health and lower household income.[7]

Detailed information regarding the prevalence and influencing factors of ECC provides a valuable tool in the planning, implementation and evaluation of oral health promotion programs. Despite several studies being done on ECC worldwide, there is a paucity of data on the prevalence of early childhood caries7 and its association with Socio-behavioural and Parental factors in Indian context, therefore an attempt is made to assess the prevalence of Early Childhood Caries and its association with Socio-behavioural and Parental factors among 2-6 year old children in Faridabad.

II. Material and Methods

A cross-sectional analytical study was carried out to assess the prevalence and severity of ECC and its association with socio-behavioural and parental factors among 2-6 year old children in Faridabad. The study population was selected from the 2-6 year old children attending kindergartens, playschools of Faridabad.

a) Inclusion criteria

- 2-6 year old children who were attending preschools, kindergartens of Faridabad.
- Children whose parents gave complete information as per the proforma.

b) Exclusion criteria

- Those children whose parents did not give consent for oral health examination of their child.
- Children who were not willing for clinical oral examination.
- Children who had major systemic disease, craniofacial deformities, syndromes or those who are on long term medication.

III. Sampling

Required study sample was obtained through cluster sampling technique with kindergartens or playschool as sampling unit.

Sample size was calculated using Open Epi Software (version 3). Based on estimated caries prevalence of 42% (using data from pilot study), 5% level of precision, 95% confidence level and a design effect of 2, minimum sample size was calculated as 749 and was rounded off as 750.

IV. Study Variables

1. Independent variables – Independent variables involved in the present study are of two types. Firstly, Parent related variables which include family income, educational level, oral health belief, and oral hygiene practices of parents. Secondly, Child related variables which include sex, age, oral health practices, dental visit pattern, deleterious oral habits, feeding and dietary practices of child.
2. Dependent variables - Prevalence and severity of ECC.

V. Method of Data Collection

Data was collected by a combination of structured questionnaire filled by the parents and clinical examination performed on their children. It was recorded on proforma specially designed for this study.

a) Questionnaire Administration

Children's parents were asked to fill a questionnaire regarding their income, occupation, level of education, oral health belief and oral hygiene habits. It also included questions regarding their child's oral hygiene practices, dietary and feeding habits, dental visit pattern, and deleterious oral habits.

b) Clinical Examination

Oral examination was conducted to examine the Dentition Status and Dental plaque status. The Dentition status will be assessed using Dentition Status Index by tooth surface (WHO criteria, 2013)[8] and Dental Plaque status will be assessed using Visible Plaque Index (Ainamo & Bay, 1975).[9]

A single examiner, assisted by a trained recording person conducted all the examinations. The calibration of the investigator was done prior to the pilot study under the guidance of faulty members in the Department of Public Health Dentistry of the institution. The examiner conducted ADA recommended Type III clinical examination with the aid of plain mouth mirror, and Community Periodontal Index probe. All bio-security measures were strictly followed.

VI. Statistical Analysis

The data collected was entered in the excel sheet using Microsoft Excel Software by the examiner. Then this data was transferred to Statistical Package for Social Sciences (SPSS) version 21, IBM Inc. for analysis. It was subjected to descriptive statistics for calculation of mean, standard deviation, absolute and relative frequencies. Presentation of data was done using Tables and Graphs. Normality of data related to interval or ratio variables was checked by Shapiro Wilk test. As data failed to follow the normal distribution, non parametric tests of significance were used. Mann Whitney U test was used for comparing the mean between two groups and Kruskal Walli's test was used to compare the means of more than two groups. Chi-square test was used for categorical variables. A level of significance was set at 0.05.

Permission from the concerned authorities of the selected schools, preschools, and kindergarten was taken prior to the study. Information sheet in English andin Hindi was provided to the parent of every subject before taking informed consent from them.

VII. Results

a) Demographic Details

Among 277 subjects belonging to 5-6 years age group, 115 (41.5%) were males and 162 (58.5%) were females. *(Table1)*

Table 1: Gender wise distribution of subjects among different age groups

AGE GROUPS	Males		Females		Total		Pa value
	N	%	N	%	N	%	
2-4 Years	207	43.8	266	56.2	473	100	0.549
5-6 Years	115	41.5	162	58.5	277	100	
TOTAL	322	42.9	428	57.1	750	100	

a Chi Square test

b) Dentiton Status

The Decayed teeth were present among 216 (28.8%) subjects. Although prevalence of decayed teeth decreased from 2-6 year old groups but these differences failed to reach the level of statistical significance ($p>0.05$). Among 5-6 year age group prevalence of Filled teeth with decay was high whereas among 2-4 years age group prevalence of Filled without decay was high($p<0.05$). Prevalence of Missing teeth due to caries across different age groups and revealed that children in 2-4 year age group were having significantly more number of missing teeth due to caries ($p<0.05$) (Table 2).

Table 2: Age group wise distribution of the study population according to dentition status

Age group	Decayed		Filled with decay		Filled without decay		Missing due to caries		dmft		Pit and fissure sealents		Prosthesis/crowns	
	N	%	N	%	n	%	n	%	N	%	n	%	n	%
2-4 years	143	30.2	5	1.1	13	2.7	24	5.1	156	33.0	0	0	0	0
5-6 years	73	26.4	9	3.2	0	0	6	2.2	74	26.7	0	0	0	0
Total	216	28.8	14	1.9	13	1.7	30	4.0	230	30.7	0	0	0	0
Pa value	0.258		0.032*		0.005*		0.05*		0.072		0.00		0.00	

*a Chi Square test, *significance at $p\leq0.05$*

c) Socio Behavioural and Parental Factors & Ecc

Mean number of decayed surface (ds) of children whose parents were either illiterate or were educated upto primary level was significantly more than that who were educated upto middle school, high school, intermediate or graduation. (Table 3).When comparison of mean number of decayed surfaces was done across different occupations, an overall statistically significant difference was not found. Mean number of decayed surfaces for children without visible plaque was found to be significantly lesser than children with visible plaque. Importance and frequency of brushing was not found to be significantly associated.

Mean ds of the children whose parents used finger/toothbrush was more when compared with the parents who used other aids of cleaning but this difference again failed to reach the level of statistical significance. Frequency of dental visit and habit of breastfeeding/bottle feeding showed an overall statistically significant difference with ds.

Supervised brushing and age at which children started cleaning their teeth was not found to be significantly associated with ds.

Table 3: Socio behavioural and parental factors & ECC

Father's education	N	Number of decayed surfaces among subjects		P value	Post hoc comparison
		Mean	Std. Deviation		
Professional or honours	1	0.00	0.00.	0.020*	6,7>5,4,3,2
Graduate or Post Graduate	24	0.16	0.48		
Intermediate or post high school diploma	8	0.50	0.53		
High school	33	0.24	0.61		
Middle School	107	0.44	1.08		
Primary (upto 5th)	337	0.57	1.02		
Illiterate	123	0.53	1.58		
Father's occupation (N=659)					
Professional	16	0.56	1.50	0.396	
Semi-professional	21	0.09	0.30		
Clerk, farmer, shop owner	19	0.47	0.69		
Skilled	78	0.60	1.34		
Semi-skilled	29	0.44	1.12		
Unskilled	496	0.48	0.98		
Visible plaque					
Absent	366	0.23	0.55	<0.001*	
Present	384	0.78	1.45		
Parental opinion about the importance of brushing (N=748)					
Its important	743	0.51	1.14	0.521	
Its not important	5	0.80	1.30		
Parental tooth paste use					
Yes	702	0.53	1.16	0.204	
No	43	0.27	0.59		
Parental use of toothpaste containing fluoride (N=734)					
Yes	446	0.49	1.04	0.521	
No	60	0.51	1.15		
Don't know	228	0.53	1.30		
Parental frequency of brushing (N=739)					
Once	595	0.52	1.21	0.370	
Twice	134	0.50	0.82		
Sometimes	7	0.42	0.53		
Never	3	0.00	0.00		
Aids used for cleaning teeth by parents (N=746)					
Tooth brush	727	0.51	1.14	0.364	
Dental floss	2	0.00	0.00		
Chewstick/ Miswak	12	0.33	0.65		
Finger	5	1.00	1.22		
Frequency of child's dental visit during past 12 months(N=741)					
Once	475	0.48	1.10	0.009*	2>1
Twice	109	0.60	0.99		
Three times or more	12	0.16	0.38		
Never	145	0.58	1.40		
Age at which child started cleaning teeth (N=750)					
With in 1 year	351	0.64	1.26	0.11	
Above 1 year	399	0.39	1.00		
Who cleans child teeth (N=732)					
Child himself	351	0.64	1.26	0.056	
With parent's assistance	292	0.35	0.69		
Under parent's supervision	89	0.56	1.69		
Direction of tooth brushing (N=733)					
Horizontal	352	0.70	1.43	0.000*	1,3>2,4
Vertical	68	0.26	0.80		
Circular	143	0.49	0.82		

Don't know	170	0.25	0.65		
Presence of breastfeeding					
Yes	672	0.46	1.00	0.001*	
No	70	0.87	1.95		
Duration of breastfeeding					
6 months	415	0.55	1.09	0.003*	1,2>3
1 year	120	0.70	1.61		1>4
2 year	146	0.27	0.70		
Three years or more	45	0.24	0.52		
Presence of bottle feeding (N=719)					
Yes	610	0.62	1.19	0.016*	
No	109	0.50	0.94		
Duration of bottle feeding					
6 months	288	0.61	1.19	<0.0001*	1,3>2,4
1 year	114	0.33	1.42		
2 year	156	0.56	1.00		
Three years or more	88	0.34	1.03		

VIII. Discussion

In the present study, feeding and oral hygiene habits and practices of the children along with the parental attitude towards oral health were determined.

a) Early Childhood Caries

Studies have found that ECC can have an overall negative effect on the oral health related quality of life of pre-schoolers. Major risk factors for ECC are minority racial status, poor access to dental care, ethnicity, number of siblings, high intake of carbohydrate snacks and parents poor knowledge about the importance of oral health. Pre-schoolers affected by ECC tend to grow slower than caries free children, may be underweight due to difficulty in eating and more likely to have dental problems as adults.

b) Sociodemographic variables

Age profile of the study population: This study population has been compared to other studies such asdone by *Nobile et al*[10], among 36-71 months old children of thirteen kindergarten of Italy, *Azevedo et al*[11], among 36-71 months old Brazillian preschool children.

Father's educational level: Children whose parents were having higher education had significantly lower mean number of decayed surfaces compared to those children whose parents had lower education. This is in accordance with the study conducted by Eronat et al[12] whereas Szatko and coworkers[13] found a strong independence of parent's educational level with their level of knowledge which influence the child's oral health.

IX. Clinical Variable

a) Early childhood caries

The results of this study demonstrated that 'd' component dominated the 'DMFT' score. The low level of dental treatment was attributed to limited accessibility to preventive and treatment services, unwillingness of practitioners to provide care for young children and primary teeth being a low priority for consideration of treatment because of a parental belief that they are temporary.

In the present study prevalence of ECC was found to be 28.8% which is similar to the study conducted by *Gopal et al*[14](27.3%)among preschoolers of Andhra Pradeshbut lower than the study conducted by *Singh S*[15] among 717 preschoolers (40%) of Bangalore city and *Sarvanan S*[16](44.4%) among 1009, 5 year old subjects of Pondicherry. This difference in the prevalence could be attributed to the fact that Faridabad has optimum or above optimum level of naturally present fluoride in the water which prevents caries. In the present study though there was found a higher prevalence of caries among females (29%) and 2-4 year (30.2%) subject group as compared to males (28.6%) and 5-6 year (26.4%) old subject group but this difference failed to reach the level of statistical significance. This finding is in contrast with the study conducted by *Infante & Gillespie et al*[17]*, Zerfowski et al*[18].

Relationship of ECC with oral hygiene status: Oral hygiene status of the preschoolers was assessed using Visible Plaque Index (VPI). In the present study poor oral hygiene was found among more than half of the study population (51.2%) and prevalence of ECC was significantly higher among subjects with visible plaque. These findings are in accordance with the study conducted by *Mohebbi et al*[19] *and Zhang et al*[20] where visible plaque was found in around 60 % of the study population significantly having more prevalence of ECC. This is due to the fact that the tooth surface loses some tooth mineral from the action of the acid formed by plaque bacteria leading to dental caries.

Relationship of ECC with parental attitude: In the present study prevalence of ECC was significantly less for those subjects who belonged to well educated families. Whereas *Qin et al*[21]concluded in their study that parental

education level did not show any significant effect on the oral health of the children.

Relationship of ECC with parental frequency of cleaning: A study by *Vanagas et al*[22] has reported that oral hygiene skills and attitudes of parents toward children oral health are significantly associated with the development of oral hygiene skills including tooth brushing in their children.

Relationship of ECC with feeding Practices and ECC: In the present study, subjects who were not breastfed had significantly higher number of decayed surfaces. This finding is in corroboration with the studies conducted by *Eronat et al*[12] and *Yonezuet al.*[23] Mean number of decayed surfaces were found to be significantly higher among subjects who were breast fed for 6 months or 2 years than those who were breastfed for three years or more. This may be due to the reason that along with bottle feeding child was ad libitum breastfed as well.

Relationship of ECC with assistance provided to the child for brushing: Results of present study showed that mean number of decayed surfaces are significantly lower (0.35±0.69) in those children who perform toothbrushing under parents supervision. These findings are in agreement with the findings of the study conducted by *Hallett and O Rourkeet al*[24] who also reported that dental prevalence of dental caries were less in the subjects with supervised brushing.

Relationship of ECC with method of brushing: Higher mean number of decayed surfaces (0.70±1.43) was observed among those practicing horizontal method of brushing in comparison with other brushing directions; however, it was statistically significant ($p<0.05$). Young children can be advised for roll on technique keeping in view the efficiency of brushing. Similar findings were reported by *Wei and Hyman et al.*[25]

Relationship of ECC with frequency of brushing: Promoting tooth brushing in preschool children is of great relevance because this is a way to favor dental health by maintaining clean teeth. In the present study the caries prevalence was lower among those children brushing their teeth twice daily, the difference in the observations obtained was statistically significant ($p<0.05$). The findings of the present study were similar to the findings of *Bjarnason et al* [26], *Kuriakose and Joseph et al* [27] who also reported decreased prevalence of dental caries with increased frequency of brushing.

X. Limitations

One of the limitation of this study is that the questionnaire was given to the subject and was instructed to get it filled by their mother and father jointly. As the questionnaire was filled at home the investigator could not have any control over it. Probably, this could be the reason of high non response rate of many items. Thus further research with face to face interviews with the parents is recommended to eliminate the non-response bias.

XI. Conclusion

Parent's understanding was good related to many factors affecting oral health, but there still exist definite lacuna, which need to be considered. As prevention is always better than cure, parent's knowledge can be one of the main key factors in preventing oral diseases and promoting the oral health of their children. There is a need to enhance dental health education activities, targeting parents of preschool age, so that preventive strategies start at an early age.

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