

Special Article - Dental Health

Dental Caries Experience among 3-5 Years Old Preschool Children in India

Ghanghas M, Kumar A, BC Manjunath*, Narang R, Shyam R and Piplani A

Department of Public Health Dentistry, Postgraduate Institute of Dental Sciences, India

*Corresponding author: BC Manjunath, Department of Public Health Dentistry, Post Graduate Institute of Dental Sciences, Rohtak, Haryana, India

Received: June 19, 2017; Accepted: October 23, 2017;

Published: October 30, 2017

Abstract

Background: Early Childhood Caries (ECC) is a significant dental public health problem which affects infants and pre-school children all over the world including India and also there is scarcity of epidemiological data regarding ECC in India. Objective: To assess prevalence of Early Childhood Caries (ECC) among 3 to 5 years old preschool children in Rohtak city, Haryana, India.

Materials & Methods: A descriptive cross-sectional study was carried out among 489 preschool children aged 3-5 years in Rohtak city, Haryana, India. Children were randomly selected from preschools of Rohtak. Dental Caries experience was recorded using 'def' index Gruebbel A.O, 1944 and questionnaire comprising socio-demographic details and oral hygiene practices was also used. Data was analyzed using Statistical Package for Social Sciences (SPSS) version 20.0. Chi-square tests were used for the comparison of proportions. P value < 0.05 was considered as statistically significant.

Results: The overall prevalence of ECC was found to be 32 % with mean deft 1.085±2.27. No significant association of dental caries was found with socio-demographic factors like gender, parental education, parental occupation, socio-economic status, no. of children, birth order, type of family and oral hygiene practices.

Conclusion: The dental caries experience was significantly high among girls when compared to boys with direct relationship with age. Demographic factors did not play a significant role in the occurrence of dental caries.

Keywords: ECC; Socioeconomic status; Preschool; Children; Prevalence; Socio demographic factors; India

Abbreviations

ECC: Early Childhood Caries; DMFT: Decayed, missing and filled teeth; DEFT: Decayed, indicated for Extraction, Filled, Teeth

Introduction

Early Childhood Caries (ECC) 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 preschool-age child between birth and 71 months of age" [1]. It is most common chronic disease in young children which may develop as soon as teeth erupts and begins as white-spot lesions in the upper primary incisors along the margins of gingival [2]. If not treated, in time, it may lead to pain, compromised mastication, malocclusion, speech problems, poor health and lower self-confidence [3]. Even though, ECC is not a life threatening disease, it is still a major dental public health problem throughout the world. It significantly affects infants and pre-school children their by leading to social, behavioral, medical, psychological, economical, and dental complications. Quality of life is also affected imposing a financial burden on their families as well [3,4].

Owing to sound scientific rationale and fact that caries is preventable, ECC is exhibiting diminishing trends in most of the developed countries, but still increasing in many developing countries and is reported to be as high as 70% [5,6]. Studies have shown that

there is a considerably high burden of ECC in India [6-8]. Descriptive studies may be helpful in designing and planning effective preventive strategies for the subjects at higher risk so as to reduce the burden of disease [9]. Rohtak city is located in Haryana, a state in North India, lies 70 km north west from New-Delhi, with a population of about one million [10]. There is a scarcity of epidemiological data regarding ECC in Rohtak city and hence the present study was carried out with an objective to assess prevalence of Early Childhood Caries among 3 to 5 years old preschool children in Rohtak city, Haryana, India.

Materials and Methods

A descriptive cross-sectional study was designed during November 2015 to March 2016 and carried out among 3-5 years old preschool children in Rohtak city, Haryana. The study protocol was reviewed by Institutional ethical committee and was granted approval for the same (PGIDS/IEC/2015/54). Official permission was obtained from the District Education Officer and also from concerned school authorities to conduct this cross sectional study. After explaining the purpose and details of the study, a written informed consent was obtained from the parents of all children aged 3-5 years.

A multi stage cluster sampling technique was employed to ensure representativeness from all parts of city. In first stage, Rohtak city was divided in to 9 clusters, and then randomly 2 clusters were chosen (Cluster 5 and Cluster 9). There are 29 schools in 9 clusters based on

Table 1: Socio-demographic characteristics of study population.

| Variable | Categories | Frequency | Percentage |
|-----------------------|---------------------------|-----------|------------|
| Age(in years) | 3 | 121 | 25.8 |
| | 4 | 205 | 43.7 |
| | 5 | 143 | 30.5 |
| Gender | Male | 271 | 57.8 |
| | Female | 198 | 42.2 |
| Mother's education | High school | 63 | 13.4 |
| | Above High school | 402 | 85.7 |
| Mother's occupation | Employed | 119 | 25.3 |
| | Unemployed | 346 | 73.8 |
| Socio-economic status | Upper | 35 | 7.5 |
| | Upper middle | 316 | 67.4 |
| | Lower middle | 97 | 20.7 |
| | Upper lower | 19 | 4.1 |
| | Lower | 2 | 0.4 |
| No. of children | 1 | 109 | 23.2 |
| | 2 or more | 360 | 76.8 |
| Child position | 1 st | 257 | 54.8 |
| | 2 nd and above | 212 | 45.2 |
| Type of family | Nuclear | 189 | 40.3 |
| | Joint | 280 | 59.7 |

geographical locations. A total of 5 schools from cluster number 5 and 4 schools from cluster number 9 were randomly chosen through lottery method. Finally from each selected school every odd roll numbered children in the age group of 3-5 years were enrolled to reach a sample of 469. Children present on the day of examination and who were willing to participate in the survey were included whereas uncooperative, children with history of systemic diseases and developmental anomalies and whose parents did not give consent were excluded. Sample size of 469 for the study was calculated at 41% prevalence derived from pilot study and 5% margin of error.

Data collection included combination of questionnaire administration and clinical examination for the caries assessment. Questionnaire comprised of data regarding socio-demographic characteristics and oral hygiene practices of study subjects and was sent to their homes to be filled by their parents. Type III clinical examination was carried out at preschool by a single calibrated examiner using mouth mirror and explorer under natural light. Dental caries experience was recorded using 'def' index Gruebbel A.O, 1944 [11]. The training and calibration of investigator was done prior to the pilot study in the Department of Public health Dentistry. The inter examiner reliability was 85%. After questionnaire recording, health education brochures were distributed to all preschool children to be given to their parents for creating awareness.

Data was analyzed using Statistical Package for Social Sciences (SPSS) version 20.0. Descriptive and inferential statistics were used. Chi-square tests were used for the comparison of proportions. P value < 0.05 was considered as statistically significant.

Table 2: Prevalence of Early Childhood Caries and association between different characteristics of study population.

| Variable | Categories | Caries prevalence | χ^2 (d.f.) p-value |
|-----------------------|---------------------------|-------------------|----------------------------|
| Age(in years) | 3 | 22.3 | 7.024 (2) * < 0.05 |
| | 4 | 35.6 | |
| | 5 | 35.0 | |
| Gender | Male | 30.3 | 0.878 (1) > 0.05 |
| | Female | 34.3 | |
| Mother's education | High school | 31.7 | 0.002 (1) > 0.05 |
| | Above High school | 32.0 | |
| Mother's occupation | Employed | 30.1 | 2.248 (1) > 0.05 |
| | Unemployed | 37.4 | |
| Socio-economic status | Upper | 22.9 | 1.755 (3) > 0.05 |
| | Upper middle | 32.6 | |
| | Lower middle | 32.0 | |
| | Upper lower | 38.1 | |
| | Lower | 32.0 | |
| No. of children | 1 | 24.8 | 3.396 (1) > 0.05 |
| | 2 or more | 34.2 | |
| Child position | 1 st | 30.0 | 1.068 (1) > 0.05 |
| | 2 nd and above | 34.4 | |
| Type of family | Nuclear | 32.3 | 0.012 (1) > 0.05 |
| | Joint | 31.8 | |

*significant at p < 0.05

Results

The present study was conducted among 469 study subjects who were in the age group of 3-5 years where 271(57.8%) were boys and 198(42.2%) were girls (Table 1). The mean age of study population was 4.05±0.749 years (Table 2). The overall prevalence of ECC was found to be 32 % with mean deft 1.085±2.27. Mean deft was higher in girls (1.131±2.294) than boys (1.052 ±2.255) (Table 3).

Higher caries prevalence (35.6%) was found in 4 years old children than 3 and 5 years and it was found to be statistically significant. Caries prevalence showed no significant association to mother's education. Children of non-working mothers had higher caries prevalence (37.4%) than those of working mother (30.1%). It was observed that caries prevalence was not significantly associated to socio-economic status in present study. Caries prevalence in children who were single to their parents (24.8%) was lower than those who had one or more siblings and also it was lower in children with first birth order. It was observed that caries prevalence in children in nuclear family 32.3% which was higher than those in joint family (31.8%) (Table 2). The mean def is highest among 4 years old female subjects (Table 3). A total of 62 children requiring immediate care were referred to the department and treated.

Discussion

Epidemiological studies from all over the world have showed that dental caries is one of the most widely distributed chronic diseases. Despite availability of evidence based preventive strategies, the burden of dental caries is increasing in India which makes it necessary

Table 3: Dental caries experience among study population.

| Age (in years) | Male | Female | Total |
|----------------|---------------|---------------|----------------|
| 3 | 0.731 ± 1.726 | 0.535 ± 1.437 | 0.661 ± 1.626 |
| 4 | 1.387 ± 2.659 | 1.465 ± 2.798 | 1.420 ± 2.712 |
| 5 | 0.851 ± 1.977 | 1.087 ± 1.953 | 0.965 ± 1.962 |
| Total | 1.052 ± 2.255 | 1.131 ± 2.294 | 1.085 ± 2.2695 |

to adopt and implement effective oral health policy. Caries prevalence in present study was found to be lower than many Indian studies reported by Tyagi P et al [5], Singh S et al [4] and Chandermohan et al [12]. This can be attributed for the fact that Rohtak is an endemic fluoride area and beneficial effects of naturally occurring fluorides may be the reason. The prevalence of ECC differs widely worldwide, ranging from 2.1% in Sweden to 85.5% in rural Chinese children [12]. This could be due to dissimilarities in ethnicity, dietary factors, cultural practices, perceived importance of oral health along with variations in case definitions and diagnostic criteria used for caries evaluation.

The mean deft in 4 years old children was significantly higher than 3 and 5 years age group which was similar to the results reported by Singh S et al [4] and Schroth et al [13]. A higher prevalence among a younger age group of an irreversible condition might indicate erroneous result despite utilizing best feasible sampling methodology. The 'd' score contributed maximally for 'def' scores which was similar to that reported by Singh S et al [4], Mahejabeen R et al [14] and Tyagi R [15]. This reflects that services available may remain unutilized due to lack of felt needs among population, disparity in treatment seeking behavior in developing versus developed countries which implicates the need for different approaches in these areas.

Higher caries prevalence was observed in girls than boys and the findings were similar to that reported by Gaidhane et al [6] and Aggarwal D et al [16] though the difference was not statistically significant. These findings were not in agreement with studies done at Lucknow where males were more affected [17]. Authors attributed this to difference to diet, geographical location and cultural differences giving more priority to males.

Kuriakose S et al [3] highlighted a strong association between oral hygiene practices and the working status of their mother. In current study, children of working mothers had lower caries prevalence than non-working mothers which was similar to that reported by Kuriakose S et al [3] and Gaidhane et al [6] which might be related to better awareness regarding oral health in them. Furthermore children of exclusive homemakers have increased servings of diet frequently leading to improper dietary practices.

Higher caries prevalence was reported in lower socio-economic class in present study which corroborates with findings of Gaidhane et al [6] and Sogi et al [18]. This disparity in dental caries experience according to socio-economic status can be explained by differences in their oral habits, sugar consumption, use of fluoride in its various forms and oral hygiene practices in addition to utilization of oral health services. Number of vendors per unit length of road increases from medium to high density areas [19] which might be responsible for ease of availability of cariogenic food, thereby increasing caries experience in high density areas which are usually inhabited by lower

socio-economic strata.

Children with first birth order showed lesser caries experience than children with subsequent birth orders in present study which was in disagreement with Dilley et al [20] who hypothesized that most children at higher caries risk would be the first-born children are at higher risk because parental knowledge and experience in child rearing would be less. Though, no significant association was found between the birth order of the child and dental caries further studies should be done to explore the relationship.

The present study, demonstrated high caries prevalence in children who are a part of nuclear families which might be due to more care of children in joint family systems and also nuclear family tend to fulfil more demands of children. Also lower caries experience was associated to good oral hygiene practices like brushing twice daily, supervised brushing, changing toothbrush in three months or when bristles fray present study similar to that reported by Kuriakose S et al [3]. They found 76.1% of children having brushing habit twice a day were caries free and recommended that parental assistance and guidance are essential to reduce the risk of developing caries.

ECC is a chronic disease which affects infants and children worldwide. In present cross-sectional study, no significant association of dental caries was found with socio-demographic factors like gender, parental education, parental occupation, socio-economic status, no. of children, birth order, type of family and oral hygiene practices showing a change in trend of dental disease which needs to be verified by further studies. As burden of dental caries is high, so treatment of dental caries would impose a great financial burden, hence effective preventive strategies should be developed and implemented. Poor perception among parents regarding various oral health problems leads to discrepancy in felt and normative needs and hence health education programs should be conducted regarding importance of oral health.

Conclusion

The dental caries experience was significantly high among girls when compared to boys with direct relationship with age. Demographic factors did not play a significant role in the occurrence of dental caries.

Recommendations

Current health policy in India focuses on mother and child health care, however oral health being an important component of overall health is being neglected and thus it is imperative that policy makers should consider integrating oral health care interventions into other national health programs.

References

1. American Academy of Pediatric Dentistry. Definition of Early Childhood Caries (ECC).
2. Kagihara LE, Niederhauser VP, Stark M. Assessment, management, and prevention of early childhood caries. *J Am Acad Nurse Pract.* 2009; 21: 1-10.
3. Kuriakose S, Prasannan M, Remya KC, Kurian J, Sreejith KR. Prevalence of early childhood caries among preschool children in Trivandrum and its association with various risk factors. *Contemp Clin Dent.* 2015; 6: 69-73.
4. Singh S, Vijayakumar N, Priyadarshini HR, Shobha M. Prevalence of early childhood caries among 3-5 year old pre-schoolers in schools of Marathahalli, Bangalore. *Dent Res J.* 2012; 9: 10-14.

5. Tyagi P. The prevalence and pattern of dental caries in preschool children. *People's Journal of Scientific Research*. 2009; 2: 1-4.
6. Gaidhane AM, Patil M, Khatib N, Zodpey S, Zahiruddin QS. Prevalence and determinant of early childhood caries among the children attending the Anganwadis of Wardha district, India. *Indian J Dent Res*. 2013; 24: 199-205.
7. Narang R, Saha S, Jagannath GV. Prevalence of Nursing Caries and its relationship with feeding practices among preschool children of Lucknow City. *Journal of Indian Association of Public Health Dentistry*. 2013; 11: 17-23.
8. 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: 74-79.
9. Khan AA, Jain SK, Shrivastav A. Prevalence of Dental Caries among the Population of Gwalior (India) in Relation of Different Associated Factors. *Eur J Dent*. 2008; 2: 81-85.
10. Rohtak District: Census data. 2011.
11. Gruebbel AO. A measurement of dental caries prevalence and treatment service for deciduous teeth. *J Dent Res*. 1944; 23: 163.
12. Chandramohan S, Mandava P. Prevalence of early childhood caries among Anganwadi school children in rural areas of Thiruvallur District. *Indian Streams Res J*. 2014; 4: 1-7.
13. Schroth RJ, Smith PJ, Whalen JC, Lekic C, Moffatt ME. Prevalence of caries among preschool aged Children in a Northern Manitoba Community. *J Can Dent Assoc*. 2005; 71: 27-33.
14. Mahejabeen R, Sudha P, Kulkarni SS, Anegundi R. Dental caries prevalence among preschool children of Hubli: Dharwad city. *J Indian Soc Pedod Prev Dent*. 2006; 24: 19-22.
15. Tyagi R. The prevalence of nursing caries in Davangere preschool children and its relationship with feeding practices and socioeconomic status of the family. *J Indian Soc Pedod Prev Dent*. 2008; 26: 153-157.
16. Agarwal D, Sunitha S, Reedy CVK, Machale P. Early childhood caries prevalence, severity and pattern in 3-6 year old preschool children of Mysore City, Karnataka. *Pesq Bras Odontoped Clin Integr*. 2012; 12: 561-565.
17. Narang R, Saha S, Jagannath GV, Kumari M, Mohd S, Saha S. The maternal socioeconomic status and the caries experience among 2-6 years old preschool children of lucknow city, India. *J Clin Diagn Res*. 2013; 7: 1511-1513.
18. Sogi GM, Bhaskar DJ. Dental caries and oral hygiene status of school going children in Davangere related to their socio economic levels - An epidemiological study. *J Indian Soc Pedo Prev Dent*. 2002; 20: 152-157.
19. Bhowmik, Sharit K. *Street vendors in the Global urban economy*. Routledge New Delhi. 2010.
20. Dilley GJ, Dilley DH, Machen JB. Prolonged nursing habit: A profile of patients and their families. *ASDC J Dent Child*. 1980; 47: 102-128.