



Prevalence of Dental Caries among 3-5 Years Old Preschool Children in Kanpur City, Uttar Pradesh, India

Dr. Arun Sharma¹, Dr. Shashi Prabha Yadav², Dr. Abhilasha Gupta³, Dr. Indranil Das⁴

¹Professor and Head, Department of Pediatric and Preventive Dentistry, Rama Dental College-Hospital & Research Centre, Faculty of Dental Sciences, Rama University, Kanpur, Uttar Pradesh, India

²Senior Lecturer, Department of Pediatric and Preventive Dentistry, Rama Dental College-Hospital & Research Centre, Faculty of Dental Sciences, Rama University, Kanpur, Uttar Pradesh, India

³Senior Lecturer, Department of Pediatric and Preventive Dentistry, Rama Dental College-Hospital & Research Centre, Faculty of Dental Sciences, Rama University, Kanpur, Uttar Pradesh, India

⁴Post Graduate Student, Department of Pediatric and Preventive Dentistry, Rama Dental College-Hospital & Research Centre, Faculty of Dental Sciences, Rama University, Kanpur, Uttar Pradesh, India

Corresponding Author: Dr. Arun Sharma

(Received: 07 October 2023)

(Revised: 12 November)

(Accepted: 06 December)

KEYWORDS

Dental Caries, Prevalence, Preschool Children, Preventive Dentistry, deft index

ABSTRACT:

Background: Early childhood caries (ECC) is a severe form of dental decay with multi-factorial origin which affects pre-school children. Early Childhood Caries (ECC) is a significant dental public health problem due to its impact on children's health and development.

Objective: To assess prevalence of Dental Caries among 3 to 5 years old preschool children in Kanpur city, Uttar Pradesh.

Materials and Method: A cross-sectional study was conducted among 1000 preschool children aged 3-5 year-old of Kanpur. Children were randomly selected from preschools of Kanpur.

Dental caries was assessed as per WHO criteria and deft index was used to measure the prevalence of caries activity for primary teeth.

Result: The prevalence of dental caries in the study group was 51.2% with the mean deft score was 3.70 ± 2.64 . Prevalence of dental caries in 3, 4 and 5 year old was 36.69%, 55.49% and 58.24% respectively.

Conclusion: An urgent need to implement preventive and curative oral health programs for preschool children and to increase awareness among the public about ECC

Introduction

Good oral health is an integral component of good general health. Although good oral health includes more than just having healthy teeth, many children have inadequate oral and general health because of active and uncontrolled dental caries. Dental caries is five times more common than asthma and seven times more common than hay fever.¹ Dental caries is an ecological disease in which the host, diet, and micro flora interact over a period of time in such a way to encourage demineralization of the tooth enamel with resultant cavity formation. Carious lesions develop at relatively protected sites in the dentition where

biofilms (dental plaque) are allowed to accumulate and mature over time. Such sites include pits, grooves and fissures in occlusal surfaces, especially during the eruption, approximal surfaces cervical to the contact point/area and along the gingival margin.² Assessment of oral health is important in deciding a treatment plan or dental public health program. In a developing country like ours the population is at a very high risk of dental caries due to lack of resources and awareness. The eating habits of children like frequent intake of refined sugar, soft and sticky food makes them more prone to dental caries. Dental caries in infants and toddlers have a distinctive pattern which is known as



Early Childhood Caries (ECC). The American Academy of Pediatric Dentistry in 2016 defined Early Childhood Caries (ECC) 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 under the age of six³. Early Childhood Caries can be classified as type I mild, type II moderate and type III severe. The severe Early Childhood Caries (S-ECC) is any sign of smooth surface caries in a child younger than three years of age, and from ages three through five, one or more cavitated, missing (due to caries), or filled smooth surfaces in primary maxillary anterior teeth or a decayed, missing, or filled score of greater than or equal to four (age 3), greater than or equal to five (age 4), or greater than or equal to six (age 5).³ Children suffer from many infectious diseases during the first 3 years of life around the time of eruption of deciduous teeth. Parents do not give sufficient attention to prevent the occurrence of these at an early age. Dental caries is a combination of child being infected with cariogenic bacteria and the frequent ingestion of sugar which makes it a unique disease.⁴ The factors responsible for dental caries include susceptible host, fermentable carbohydrate diet, presence of dental plaque, a high number of cariogenic microorganisms such as *Streptococcus mutans*, *Lactobacillus*, and most importantly time. Dietary habits, socioeconomic status, working status of mother, oral hygiene habits and frequent intake of medications are certain risk factors for this condition.⁵ Dental caries is considered as a frivolous public health problem as it is a complex disease of primary dentition which relay earnest socio-behavioral issues that afflict mainly the infants and toddlers. Dental caries if left untreated, the deleterious effects are pain, compromised chewing ability, malocclusion, phonetic problems, sub optimal health, lower self-esteem.⁵ Tooth extraction may affect the alignment of the permanent teeth and increases the risk of orthodontic problems later in life. A considerable proportion of preschoolers are still being affected by dental caries.⁶ Despite the preventive measures and awareness, the prevalence rate of dental caries is steadily increasing in our country.⁵ Descriptive studies may be helpful in designing and planning effective preventive strategies for the subjects at high risk so as to reduce the burden of disease.⁷ The control of dental caries in young children is a continuing problem and it

is easier to manage if groups of population with greatest needs are identified. High risk group children with primary teeth decay should be identified and categorized which in turn will be useful to determine need for restorations and to implement primary preventive procedures in the targeted groups. The dental health of preschool children has not been clearly documented to the same extent as the dental health of school children.⁴ Various studies have been conducted to assess the prevalence of ECC in India and other countries. Henry et al⁸ conducted a study on the prevalence of Early Childhood Caries in around 1500 children aged 0-3 years in Chennai and concluded the prevalence of Early Childhood Caries to be 40.6%. A similar study was done by Koya et al⁹ in 2016 on 24-71 months old children of West Godavari district, Andhra Pradesh and found the prevalence of Early Childhood Caries to be 41.9%. Also, Mangla et al¹⁰ in 2017 conducted a study on children aged 12-36 months in Himachal Pradesh and concluded the prevalence of severe ECC to be 21%. There is scarcity of epidemiological data regarding prevalence of dental caries in Kanpur city, and hence the present study was carried out with the aim to assess the prevalence of dental caries among 3-5 years old preschool children in Kanpur city, which is located in central-western part of Uttar Pradesh, India.

Materials and Method

A cross-sectional study was conducted among 1000 children was to assess the prevalence of dental caries among 3-5 year-old preschools children of Kanpur. The samples were selected using simple random sampling. The clinical examination was done entirely by a single examiner to avoid the risk of inter examiner variability. Before conducting the study, the examiner was calibrated at the Department of Pedodontics and Preventive Dentistry, Rama Dental College-Hospital & Research Centre, Kanpur in order to limit examiner variability. A written consent was obtained from the parents for the participation of their child in this study. Permission was obtained from the concerned authority of the pre-schools and Research and Ethical committee of Rama Dental College-Hospital & Research Centre. Inclusion criteria were- Age 3 to 5 years, Gender male/female, Socio-economic status varied, willing to participate in the study. Exclusion criteria were- Children with special health care need, medically

**Table 4:** Dental caries experience in the study group according to male and female

Age Group	Dental Caries				Total	Chi Square	p value
	Male		Female				
	N	%	N	%			
3 years	46	16.55	56	20.14	102/378	3.41	0.13
4 years	73	25.89	139	36.38	212/382	5.98	0.04*
5 years	64	18.82	134	39.41	198/340	9.93	0.008*
Total	183	51.84	329	50.85	512/1000	*:statistically sig.	

Table 5: Distribution of mean dt, et,ft and deft scores by age group

Age Group	dt	et	ft	def
3 year	2.04 (2.68)	0.21 (0.31)	0.22 (0.19)	2.32 (1.67)
4 year	1.01 (1.57)	0.18 (0.17)	0.20 (0.11)	1.23 (1.42)
5 year	0.97 (1.04)	0.14 (0.08)	0.12 (0.13)	1.07 (1.17)
p value	<0.01	0.21	0.07	<0.01

Note: dt= decayed teeth, et: extracted teeth, ft= filled teeth, ^a: ANOVA

Discussion

Early childhood caries can be described as a social, political, behavioral, medical, psychological, economical and dental problem. It is considered as a social and political problem because it is endemic in disadvantaged children, regardless of race, ethnicity, or culture. These disadvantaged children suffer from diseases; hunger, lack of education, family support, and parental employment. ECC can be a medical problem, because infants with ECC continue to grow at a slower pace compared to caries-free infants. Children born after maternal complications during pregnancy or who have had traumatic births are at risk of developing ECC. Moreover, children with severe ECC often require costly treatment with hospitalization under sedation or general anesthesia. The oral health of preschoolers is often overlooked aspect due to certain disbeliefs that deciduous teeth will anyway get replaced by permanent teeth. Preventive methods are not applied to many vulnerable children, who later develop serious dental problems. These children constitute a population vulnerable to caries because of their dependence and inability to communicate with their parents.¹¹ Determining the prevalence of caries in preschool children is a difficult process as the children of this age group are not easily accessible,

uncooperative, a detailed examination of the oral cavity cannot be easily accomplished and no separate criteria has been developed for evaluating the extent and degree of caries in children below 3 years because of varied number of erupted teeth.¹² Clinically, decay is first found in maxillary primary incisors, later it spreads to maxillary molars, mandibular molars and rarely mandibular incisors.¹³ The major reason of hike in dental problems in such young age is lack of awareness and negligence in oral hygiene practice. The present study consisting of 1000 subjects describes that the prevalence of dental caries in pre-school children of 3 to 5 years of age in Kanpur district, Uttar Pradesh was 51.2% with a mean deft score of 3.70 with a standard deviation of 2.64. Major contributor of the def score was the (d) decayed teeth component. Similarly, Kuriakose et al in 2015 in Kerala, India reported the prevalence of caries in children less than 5 years to be 54%.¹⁴ Also, Jaff L and Awasthi S in 2016 reported that prevalence of caries in 2-5 year old children was 45% with a mean deft of 2.1 and 56.3% with a mean deft of 2.86 respectively.^{15,16} Similar prevalence was reported by Singh S et al in Bangalore, India and Dawan NI et al in Karachi, Pakistan in 2012 where they reported the prevalence of caries in 3-5 year old pre- school children was 40% with a mean deft of



1.89±3.3 and 51% with a mean deft of 2.08±3.0 respectively.^{17,18}

In spite of this fact, this percentage is significantly high keeping in perspective the biological consequences and financial burden of treating the disease in question, in accordance to our current low budget health system. In India, the earliest references of dental caries status dates back to 1939, when Taylor and Day reported low prevalence of caries in children of Kangra valley, Punjab. In the past many studies have been conducted to determine the prevalence of dental caries in pre-school children in various parts of the world and there is a huge difference in the statistical data. This could be related to lack of universally accepted definition of nursing caries and no suitable epidemiologic index for measurement of nursing caries. It has varied from 19.2% as reported by Tyagi R¹⁹ in 2014 in Davangere, India to 98% as reported by Pierce A et al in 2019 in Canada.²⁰ In the present study, study subjects were categorized into 3 groups based on age as 3 year old, 4 year old and 5 year old. Among 278 subjects aged 3 years 102 (36.69%) had caries with a mean deft score of 2.32±1.67. Among 382 subjects aged 4 years 212 (55.49%) had caries with a mean deft score of 1.23±1.42. Among 340 subjects aged 5 years 198 (58.24%) had caries with a mean deft score of 1.07±1.17. Sufia S et al (2011) in Lahore, Pakistan reported that caries prevalence was 33.3% with a mean deft score of 1.55 ± 3.17 in 3 year old, 47.6% with a mean deft score of 2.09 ± 3.19 in 4 years old and 75% with a mean deft score of 4.66 ± 5.29 in the 5 year old children.²¹ Singh S et al (2012) in Bangalore reported that 44.8% of 3 year old children with a mean deft score of 1.86 ± 2.98, 35% of 4 year old with a mean deft score of 2.0 ± 3.80 and 41% of 5 year old with a mean deft of 1.81 ± 3.10 had Early Childhood Caries.¹⁷ Dawan NI et al (2012) in Karachi, Pakistan reported that 16.7% of 3 year old with mean deft score of 1.65, 38.1% of 4 year old with a mean deft of 2.11 and 43.7% of 5 year old with a mean deft of 2.16 had dental caries.¹⁸ Dixit A et al (2015) in Gujarat, India reported that 82.4% 36-42 months old children with a mean dmft score of 3.35 ± 2.25, 74.5% 42-48 month old children with a mean dmft score of 2.97 ± 2.13 and 64.2% 54-60 months old children with a mean dmft score of 2.17 ± 2.05 had caries.²² In the present study, among the 512 study subjects out of 1000 who had caries, 183 were males and 329 were

females. In the age group of 3 years, out of 102 subjects who had caries, 46 were males and 56 were females. There was no significant difference. In the age group of 4 years, out of 212 subjects who had caries, 73 were males and 139 were females. The result was significant at p value <0.1. In the age group of 5 years, out of 198 subjects who had caries, 64 were males and 134 were females. The result was significant at p value <0.1. In the present study we observed that caries prevalence was more in females as compared to males. This may be due to the fact that while examining number of female candidates were more than males. Similarly, Dawani N et al (2012) conducted a study in Karachi, Pakistan and reported that 509 children out of 1000 had caries in which 212 were males and 297 were females.¹⁸ Also Dixit A et al (2015) conducted a study in Gujarat, India and reported that 737 children out of 1036 in the age group of 3-5 years had caries. Out of 737 who had caries, 364 were males and 373 females. Although mean dmft was higher for males.²² In contrast to our study, several researchers concluded that males had more caries than females. Narang R et al in 2012 reported that Out of the 512 subjects examined, 65.2% (334) were males and 34.8% (178) were females. Out of 169 children with nursing caries, majority of them were males (61.5%:104) with 38.5% (65) females.²³

Gupta D et al in 2015 also concluded that caries prevalence was higher in males (46.5%) than females (41.7%).²⁴ Dixit A et al in 2015 reported that the prevalence of dental caries was higher in males 76.3% as compared to females 66.7%. The mean dmft of the study population with respect to gender was 2.98±2.16 in males and 2.50±2.17 in females respectively.²² Although there was no clear reason for higher predilection of caries in any gender in pre-school children and there are numerous studies in favor of both the aspects.

In the present study, the decayed component for subjects aged 3 years was 2.04 (2.68%), for aged 4 years was 1.01 (1.57%) and for 5 year old was 0.97 (1.04%). The extracted teeth component for subjects aged 3 years was 0.21 (0.31%), for aged 4 years was 0.18 (0.17%) and for 5 year old was 0.14 (0.08%). The filled component for subjects aged 3 years was 0.22 (0.19%), for aged 4 years was 0.20 (0.11%) and for 5 year old was 0.12 (0.13%). Overall, mean decayed teeth component was 3.10 with a



standard deviation of 2.34, extracted teeth component was 0.40 with a standard deviation of 0.73 and filled teeth component was 0.20 with a standard deviation of 0.15. Dawan N et al in 2012 also reported that mean deft score was 4.08 with dt 3.83, et 0.19 and ft 0.04 respectively. The deft score for 3 years old was 1.65, for 4 year old was 2.11 and for 5 year old was 2.16. They concluded that the highest contributor of deft score was the decayed 'dt' component.¹⁸ Also, Gupta D et al in 2015 reported that mean dt for 3 year old was 1.22 ± 0.10 , for 4 year old was 1.80 ± 0.62 and for 5 year old was 2.18 ± 0.69 . Mean et for 3 year old was 0.13 ± 0.03 , for 4 year old 0.16 ± 0.04 and for 5 year old was 0.16 ± 0.65 . Mean ft for 3 years old was 0.13 ± 0.03 , for 4 year old was 0.07 ± 0.02 and for 5 year old was 0.05 ± 0.31 .²⁴ Decayed teeth formed the major component of total deft score, followed by teeth indicated for exfoliation or are missing due to caries (et component) and the least contribution was of filled teeth. Comparable proportions are evident in majority of studies. The attributed explanation might be that majority of children do not undergo dental restorations primarily because parents cannot afford high treatment cost, lack of affordable dental services, and false perceptions of parents regarding significance of retaining primary teeth; while those who undergo treatment prefer extraction rather than restorations.²⁴ Similarly, Dawani N et al (2012) conducted a study in Karachi, Pakistan and reported that 509 children out of 1000 had caries in which 212 were males and 297 were females.¹⁸

Also Dixit A et al (2015) conducted a study in Gujrat, India and reported that 737 children out of 1036 in the age group of 3-5 years had caries. Out of 737 who had caries, 364 were males and 373 females. Although mean dmft was higher for males.²² In contrast to our study, several researchers concluded that males had more caries than females. Narang R et al in 2012 reported that Out of the 512 subjects examined, 65.2% (334) were males and 34.8% (178) were females. Out of 169 children with nursing caries, majority of them were males (61.5%:104) with 38.5% (65) females.²³ Gupta D et al in 2015 also concluded that caries prevalence was higher in males females (41.7%).²⁴ Dixit A et al in 2015 reported that the prevalence of Dental caries was higher in males 76.3% as compared to females 66.7%. The mean dmft of the study population with respect to gender was 2.98 ± 2.16 in

males and 2.50 ± 2.17 in female's respectively.²² Although there was no clear reason for higher predilection of caries in any gender in pre- school children and there are numerous studies in favour of both the aspects. In the present study, the decayed component for subjects aged 3 years was 2.04 (2.68%), for aged 4 years was 1.01 (1.57%) and for 5 year old was 0.97 (1.04%). The extracted teeth component for subjects aged 3 years was 0.21 (0.31%), for aged 4 years was 0.18 (0.17%) and for 5 year old was 0.14 (0.08%). The filled component for subjects aged 3 years was 0.22 (0.19%), for aged 4 years was 0.20 (0.11%) and for 5 year old was 0.12 (0.13%). Overall, mean decayed teeth component was 3.10 with a standard deviation of 2.34, extracted teeth component was 0.40 with a standard deviation of 0.73 and filled teeth component was 0.20 with a standard deviation of 0.15.

Conclusion

Epidemiology of any disease is a very helpful tool to assess the actual status of the disease among population. Diversity in population of India with respect to dental caries necessitates for the study of different factors associated with dental caries. However, this work is a small effort towards understanding of dental caries in terms of age and gender. Determining the prevalence of dental caries in preschool children of the age 3-5 years in the Kanpur district of Uttar Pradesh was the main objective of the present study. The prevalence of dental caries in this part of India was more than 50% which was high. The main reason attributed to this situation was lack of awareness and lack of oral health care facilities. The main contributor for deft score was decayed component. Preventive and restorative treatment was merely performed for this age group in this region. More detailed collaborative study are required to infer actual role of the associated factor in dental caries etiology. The data can be helpful for designing the preventive measures against dental caries. Results reveal an urgent need to increase awareness among the public about ECC. The establishment of "good oral health practices early in life can lead to a healthier mouth" in later years of life. For this to happen, awareness of the various oral disorders, their causes, prevention and cure must be created at the earliest available opportunity so as to install positive attitude



among Parents /Caregivers.

References

1. Fejerskov O, Kidd E. Dental Caries the Disease and its Clinical Management. 2nd ed. Blackwell Munksgaard Ltd; 2008.
2. Dean JA, Jones JE, Walker V. McDonald and Avery's Dentistry for the Child and Adolescent. 9th ed. Elsevier Inc; 2011.
3. Oral Health Policy on Early Childhood Caries (ECC): Classifications, Consequences, and Preventive Strategies. AAPD. The Reference Manual of Pediatric Dentistry 2023-24. pp. 88-91
4. Mahejabeen R, Sudha P, Kulkarni S, Anegundi R. Dental caries prevalence among preschool children of Hubli: Dharwad city. J Indian Soc of Pedod Prev Dent. 2006;24(1):19-22
5. 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(1):69-73
6. Simratvir M, Moghe GA, Thomas AM, Singh N, Chopra S. Evaluation of caries experience in 3-6-year-old children, and dental attitudes amongst the caregivers in the Ludhiana city. J Indian Soc Pedod Prev Dent. 2009;27(3):164-69
7. Ghanghas M, Kumar A, Manjunath BC, Narang R, Shyam R and Iplani A. Dental Caries Experience among 3-5 Years Old Preschool Children in India. Austin J Public Health Epidemiol. 2017;4(3):1063
8. Henry JA, Muthu MS, Saikia A, Asaithambi B, Swaminathan K. Prevalence and pattern of early childhood caries in a rural South Indian population evaluated by ICDAS with suggestions for enhancement of ICDAS software tool. Int J Pedo Dent. 2016;27(3):191-200.
9. Koya S, Ravichandra KS, Arunkumar VA, Sahana S, Pushpalatha HM. Prevalence of Early Childhood Caries in Children of West Godavari District, Andhra Pradesh, South India: An Epidemiological Study. Int J Clin Pediatr Dent. 2016;9(3):251-5.
10. Mangla R, Kapur R, Dhindsa A, Madan M. Prevalence and associated Risk Factors of Severe Early Childhood Caries in 12- to 36-month-old Children of Sirmaur District, Himachal Pradesh, India. Int J Clin Pediatr Dent. 2017;10(2):183-7.
11. Prakash P, Subramaniam P, Durgesh BH, Konde S. Prevalence of early childhood caries and associated risk factors in preschool children of urban Bangalore, India: A cross-sectional study. Eur J Dent. 2012;6(2):141-52.
12. Dye BA, Shenkin JD, Ogden CL, Marshall TA, Levy SM, Kanellis MJ. The relationship between healthful eating practices and dental caries in children aged 2-5 years in the United States, 1988-1994. J Am Dent Assoc. 2004;135(1): 55-66
13. Ripa LW. Nursing caries: a comprehensive review: Pediatr Dent 1988;10(4):268-82.
14. Kuriakose S, Prasannan M, Remya KC, Kurina J, Sreejith KR and K. R. Prevalence and related risk factors of ECC among preschool children residing in rural and urban areas of Trivandrum district in Kerala. Contemp Clin Dent 2015;5: 69-73.
15. Jaff L, Bala S. The prevalence of early childhood caries among children between 2-4 years old in Kirikkale, Turkey. Faculty of Dentistry, University of Kirikkal 2016
16. Aswathi S, Faizal CP, Chandru TP. Feeding practices and prevalence of early childhood caries among preschool children in urban and rural areas of Kannur district. Int J Dent Res. 2016;4(1):11-15.
17. 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. J Dent Res. 2012 ;9(6):710-14
18. Dawani N , Nisar N , Khan N , Syed S, Tanweer N. Evaluate the frequency of dental caries among pre-school children of Saddar Town, Karachi, Pakistan and the factors related to caries. BMC Oral Health. 2012;12(1):59.
19. 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; 26:153-7.
20. Pierce A, Singh S, Lee J, Grant C, de Jesus VC, Schroth RJ. The burden of early childhood caries in Canadian children and associated risk factors. Front Public Health. 2019;(7)328:1-16.
21. Sufia S, Chaudhry S, Izhar F, Syed A, Qayum Mirza BA, Ali Khan A. Dental Caries Experience in Preschool Children—Is It Related to A Child's Place of Residence and Family Income. Oral Health Prev Dent 2011;9(4):375-79
22. Dixit A, Aruna DS, Sachdev V, Sharma A.



Prevalence of dental caries and treatment needs among 3-5 year old preschool children in Narmada, Gujarat. IOSR J Dent Med Sci.2015;14(1):97-101.

23. Narang R, Mittal L , Jha K , Anamika A. Caries Experience and Its Relationship with Parent's Education, Occupation and Socio Economic Status of the family among 3-6 Years Old Preschool Children of Sri Ganganagar City, India. Open J Dent Oral Med.2013;1(1):1-4.
24. Gupta D, Momin RK, Mathur A, Srinivas KT, Jain A, Dommaraju N, Dalai DR, Gupta RK. Dental caries and their treatment needs in 3-5 year old preschool children in a Rural District of India. North Am J Med Sci 2015;7:143-50