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Assessment of the prevalence of early childhood caries and associated risk factors in preschool children in Kadapa, Andhra Pradesh, India: A cross-sectional study

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Abstract---Aim: The aim of this cross-sectional study is to investigate the prevalence and related risk factors of early childhood caries (ECC) in preschool children of district Kadapa, Andhra Pradesh, India. Materials and Methods: A total sample of 2859 children aged between 2 and 6 years were selected from Kadapa, Andhra Pradesh, India. The status of dental caries and decayed missing and filled teeth (DMFT) score was recorded. Results: ECC increased significantly with age. Boys had significantly higher caries prevalence and mean DMFT score as compared to girls. Children who belonged to low socioeconomic group showed higher caries prevalence and mean DMFT score.

Children aged 3–6 years who brushed their teeth twice daily had the least prevalence of dental caries as well as DMFT score when compared to children with one time and no brushing. Conclusion: The early identification of poor oral hygiene and improper feeding habits should be considered in preventive health promotion in low socioeconomic communities of Kadapa, Andhra Pradesh, India.

Keywords--caries prevalence, decayed missing and filled teeth, early childhood caries.

Introduction

The primary dentition may be affected by early childhood caries (ECC), a catastrophic form of caries, as soon as an infant's teeth sprout. [1] The American Academy of Pediatric Dentistry and the Centers for Disease Control and Prevention adopted the term "ECC" in 1994. After the National Institute of Dental and Craniofacial Research made the recommendation, it took the place of previous terms that defined its origin, such as breastfeeding caries and infant bottle teeth decay. [2] According to studies, ECC is more common in children from households with more siblings[3] and those whose moms are younger, with a prevalence of 50–80 percent in the high-risk group. [4] Other factors that are linked to a higher frequency of dental disease include parents with low levels of education, low monthly family income, children who are breastfed or bottle fed at night, poor oral hygiene, low socioeconomic status, and inadequate fluoride exposure. [5] According to the literature, young parenting, a lack of education, and a lack of oral health information may contribute to a higher prevalence of ECC in kids. [6] Numerous studies conducted in India have found that the prevalence of ECC in the country's various regions ranges from 27 percent to 58 percent. Despite the importance of the issues caused by ECC, there haven't been many prevalence studies in Andhra, which may be because it's hard to reach this age range. To create focused treatments for the prevention of following tooth decay and to reduce the number of children who require emergency care, it is essential to have knowledge about the prevalence and associated variables of ECC. Consequently, the following was the study's goal:

- To find out how common ECC is among preschoolers in the Indian state of Andhra Pradesh's district Kadapa.
- To examine any potential relationships between ECC and variables such as chronological age, birth weight, geographic distribution, socioeconomic status, the mother's level of education, feeding practises, and oral hygiene standards, as well as other characteristics relating to children.

Materials and Methods

Children in Kadapa, Andhra Pradesh, who attend school were taken into consideration for the study. The type III examination technique recommended by the American Dental Association was used. Before checking out the kids, permission was obtained from the school administration. Each youngster was checked while sitting upright in a typical chair, using a mouth mirror and an

explorer, in good natural light. To reduce mistake, only one examiner conducted the examination. The information was entered onto a 2013 version of the WHO Oral Health Assessment form. Following that, the clinical and survey data were examined using IBM SPSS Statistics for Windows (Version 22.0, IBM Corp., Armonk, New York, USA). The Student's t-test and Pearson's Chi-square were used to determine the statistical significance and determine the impact of each variable. The $P < 0.05$ was considered to be statistically significant.

Results

The prevalence of caries and DMFT (decayed missing and filled teeth) in 1000 district youngsters. Both the caries prevalence and the DMFT score rose with age and reached significance by the time the kid turned 5 [Table 1]. Males exhibited higher mean DMFT and caries prevalence in the current study than females [Table 2]. Children in rural settings are more likely to have ECC than those in urban areas [Table 3]. Children who were fed by bottle had higher caries prevalence and DMFT than those who were breastfed or fed by glass, according to Table 4 [Table 4]. Children with poor socioeconomic level and the children of moms who just attended school were found to have greater rates of ECC and mean DMFT [Tables 5 and 6]. When compared to children who brushed their teeth once or twice a day, children who did not brush their teeth had the highest caries prevalence and mean DMFT score (Table 7). Children's birth weight and the prevalence of caries were not significantly correlated in the current study [Table 8].

Table 1
Comparison of caries prevalence and number of carious tooth based on age

Age (years)	n	Caries present, (%)	χ^2	P	Number of carious tooth		P
					Mean	SD	
2-3	250	30	21.332	<0.001*	3.19	2.61	0.058
3-4	250	51			3.50	2.54	
4-5	250	51			3.55	2.96	
5-6	250	52			3.67	2.98	

*Represents significant P value ($P \leq 0.05$). SD=Standard deviation

Table 2
Comparison of caries prevalence and number of carious tooth based on gender

Gender	n	Caries present, (%)	χ^2	P	Number of carious tooth		P
					Mean	SD	
Female	500	45	11.639	0.001*	2.97	2.40	<0.001*
Male	500	55			3.78	3.15	

*Represents significant P value ($P \leq 0.05$). SD=Standard deviation

Table 3
Comparison of caries prevalence and number of carious tooth based on the geographic distribution

Location	n	Caries present, (%)	χ^2	P	Number of carious tooth		P
					Mean	SD	
Rural	670	70	5.706	0.017*	3.46	2.76	0.836
Urban	330	30			3.45	2.79	

*Represents significant P value ($P \leq 0.05$). SD=Standard deviation

Table 4
Comparison of caries prevalence and number of carious tooth based on the feeding pattern

Feeding pattern	n	Caries present, (%)	χ^2	P	Number of carious tooth		P
					Mean	SD	
Glass feeding	500	50	52.245	<0.001*	2.89	2.04	<0.001*
Breastfeeding	200	32			3.12	2.11	
Bottle feeding	300	51			3.92	2.96	

*Represents significant P value ($P \leq 0.05$). SD=Standard deviation

Table 5
Comparison of caries prevalence and number of carious tooth based on socioeconomic status

Socioeconomic status	n	Caries present, (%)	χ^2	P	Number of carious tooth		P
					Mean	SD	
Low	500	50	7.785	0.051*	3.71	2.13	<0.001*
Middle	320	32			3.17	2.44	
High	180	18			2.86	2.24	

*Represents significant P value ($P \leq 0.05$). SD=Standard deviation

Table 6
Comparison of caries prevalence and number of carious tooth based on the education level of mother

Economic status of mother	n	Caries present, n (%)	χ^2	P	Number of carious tooth		P
					Mean	SD	
Graduate	620	62	6.532	0.042*	2.37	2.06	<0.001*
Schooling	380	38			3.90	2.54	

*Represents significant P value ($P \leq 0.05$). SD=Standard deviation

Table 7
Comparison of caries prevalence and number of carious tooth based on oral hygiene practice

Oral hygiene practice	n	Caries present, n (%)	χ^2	P	Number of carious tooth		P
					Mean	SD	
No brushing	210	21	30.020	<0.001*	3.98	2.63	<0.001*
One time brushing	600	60			3.40	2.46	
Two-time brushing	300	30			2.09	1.82	

*Represents significant P value ($P \leq 0.05$). SD=Standard deviation

Table 8
Comparison of caries prevalence and number of carious tooth based on birth weight

Birth weight	n	Caries present, n (%)	χ^2	P	Number of carious tooth		P
					Mean	SD	
Low (<2.5)	550	55	0.026	0.872	3.36	2.67	0.135*
>2.5	450	45			3.54	2.87	

*Represents significant P value ($P \leq 0.05$). SD=Standard deviation

Discussion

Oral health is one component of general health and also an important factor in the normal development of a child. The oral health of preschoolers is an overlooked aspect of childhood health and well-being, especially in cases of ECC.

Age

In the present study, the prevalence of dental caries increased with age and became significantly higher by the time child reached 5 years of age, which was in accordance with study done by Goel *et al.*[7] with similar results. There is an increased number of erupted primary teeth which becomes exposed to the oral environment and cariogenic challenges. In addition, as children grow older there is a change in the dietary habits and hygiene practices leading to increase in dental caries. However, Berkowitz *et al.* [8] revealed no evidence of an age difference in ECC occurrence. However, Berkowitz *et al.*,[8] revealed no evidence of an age difference in ECC occurrence. [9] Additionally, the mean DMFT score increased with age in the current study and peaked in the 5–6 year age group at 3.67, but this finding was not statistically significant and was consistent with a study by Jain *et al.* (2015) that likewise revealed no statistically significant difference.

Gender

The current investigation demonstrated that boys had a higher prevalence of caries than did girls. Ferraro and Vieira demonstrated equivalent outcomes. [10] According to Ferraro, there are different impacts of genes impacting dental caries in boys, and this may help to explain some of the sex differences. The increased occurrence in boys may be attributed to their habits of consuming soft drinks and other sweetened snacks during their prolonged outside stay. In contrast to Kalayni and Govindranjan's (2004)[11] findings, our study found a higher frequency in girls than in boys. According to a study by Panwar et al.[12] who reported comparable results, boys likewise had a higher mean DMFT score in the current study than did girls. However, Rai et al. (2006),[13] and Al-Samadani (2017)[14] discovered that females had a higher mean DMFT score than did men.

Geographical Area

Children who lived in rural areas in the current study had a higher prevalence of ECC than children who lived in urban areas, and the difference was determined to be statistically significant. Our research was in line with studies by Irigoyen, Perinetti, and others that produced comparable findings. The high rate of ECC in children living in rural locations seems to be caused by isolation from urban centres, limited or inadequate knowledge regarding oral health care, and ineffective bacterial control techniques. [17] Due to a scarcity of dental professionals, tight budgets, and a lack of awareness among rural populations of the need for dental care, access to oral health care is restricted in rural areas. [18] However, a research by Srisilapanan et al.[19] revealed that metropolitan areas had higher dental caries prevalence than rural ones.

Feeding methods

Children who were bottle-fed in the current study had the highest caries prevalence, at 58.9 percent, followed by those who were breast-fed, at 54.8 percent. Children who consumed glass milk had the lowest prevalence of 50% among all the categories, which was consistent with the findings of Avila et al. [20] Due to inappropriate eating habits, such as bottle feeding for longer than one year, the frequency of caries was highest in children who were fed via bottle. Primary teeth are more likely to be exposed to fermentable carbohydrates during prolonged or on-demand breastfeeding and when kids are put to bed with nursing bottles. [21] Frequent bottle feedings and extended enamel contact with bottle milk cause an acidogenic condition that causes enamel to soften. [22] According to Mohammadi et al study, 's the current study also revealed that bottle-fed children had the highest DMFT scores, followed by breast-fed children. [23]

Education of mothers

A child's primary carers are their mothers. The prevalence of dental decay in children whose mothers have less education is higher. [24] According to the current study, children of mothers who merely attended school had higher caries prevalence and higher mean DMFT scores than children of mothers who had graduated from college, and these findings were statistically significant. These

findings were in line with those of Al-Meedani and Al-Dlaigan[25], Prakash et al.[26], and Ramos-Gomas (2014)[27], who discovered that the mother's level of education had no relationship to the extent of dental caries (ECC) in their study. These results make it clear that all women, regardless of their level of education, should get instruction on how to care for their children's oral health.

Socioeconomic status

Caries risk may be impacted by social status in a number of ways. Low income has an impact on one's level of education, health, values, lifestyle, and access to health care information, which raises one's risk of developing cavities. [28] According to the results of the current investigation, which are comparable to those of Saldnait et al.,[29], reduced caries prevalence was associated with greater socioeconomic level. Gao and co., [30] Tiberia and others [6] Poor financial, social, and material circumstances that limit their capacity to take care of themselves, maintain good oral hygiene, including the use of clean toothbrushes that should be changed every six months, obtain professional oral health care services, and live in a healthy environment, all of which contribute to lowered resistance to oral and other diseases, may put people with low socioeconomic status at an increased risk of developing ECC. Additionally, it has been noted that children from low socioeconomic backgrounds tend to have unhealthful eating habits and more pessimistic views on health. However, Popoola et al study .s indicated that children from high socioeconomic position were more likely to have caries than those from middle and low socioeconomic status. In line with Stephen et al study,[32] .s the current study revealed that the mean DMFT score was also higher in low socioeconomic status children when compared to middle and high socioeconomic group, while Babo Soares et al.'s[33] study discovered that middle socioeconomic status children had higher mean DMFT scores.

Dental hygiene

According to studies by Soroye and Braimoh[34], Veiga[35], and Parasuraman et al.[36], who reported that increased frequency of tooth brushing is an important determinant in lowering the prevalence of dental caries and mean DMFT in children, the prevalence of caries in the children who did not brush their teeth was significantly higher than in those children who brushed their teeth twice a day. This suggests that brushing teeth at least twice a day may prevent caries from developing on the teeth by more efficiently eliminating dental plaque and lowering the risk of caries in youngsters. However, their caries prevalence and mean DMFT score were lower when compared with children of the no brushing group, and this was found to be nonsignificant. Children who brushed their teeth once a day also had higher caries prevalence and mean DMFT scores than children who brushed their teeth twice a day.

Birth weight

Low birth weight and preterm births, according to Ala Ershiedt's (2014) research, increase the risk of streptococcal colonisation as well as the occurrence of enamel hypoplasia, salivary problems, and greater levels of dental caries. However, there was no discernible difference between birth weights below and over 2.5 kg for the

caries prevalence or mean DMFT score in the current study. The outcomes matched those of the Tanaka and Miyake study. [37]

Conclusion

The multifactorial illness is ECC. The goal of this study was to examine every factor that could have an impact on ECC, including age, sex, feeding, oral hygiene, maternal education, socioeconomic status, geographical distribution, and birth weight. It was discovered that prolonged bottle and breast feeding, low maternal education, and low socioeconomic status all had a significantly negative impact on ECC, but that birth weight and geographic distribution had no such impact. Because there were more tooth surfaces exposed to cariogenic challenge as a kid became older, there was a significant increase in the number of teeth impacted with ECC and DMFT score. To make our society caries-free, more needs to be done in the areas of maternal education, societal awareness, appropriate feeding habits, and dental hygiene practises.

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