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"Prevalence of Early Childhood Caries in Preschool Children Attending Anganwadis in Mysuru Urban, Karnataka"

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ABSTRACT

Background: Early childhood caries (ECC)is the presence of 1/more decayed, missing, filled tooth surfaces in any primary tooth in a child ≤71 months of age. In children <3 years of age, any sign of smooth-surface caries is indicative of severe ECC. O**bjective:**To determine the prevalenceof ECC in 3 to 6 years old children attending Anganwadis and to find an association between feeding practices of children with ECC.**Methodology:**A total of 377 children were examined and their dental caries status was measured by the decayed, missing, filled surface (dmfs) index for deciduous teeth given by WHO, Oral Health Survey, Basic Method (2013). Structured questionnaires for the caregivers were used to gather information on feeding practices. Data wereanalyzed using SPSSV.25. **Results:**Prevalence of ECCwas 45.9% with the mean dmft and dmfsof 1.9 ± 0.8. and 2.4±1.39 respectively. A nearly equal proportion of males (50.3%) and females(49.7%) were affected. Maxillary arch was affected more (74.9%) than mandibular arch (25.8%). ECC was significantly increased with the duration of bottle-feeding and lower among those who were breastfed till 1 year. **Conclusion:**Prevalence of ECC in Anganwadi children was high and dmft was due to untreated caries.

Keywords: Anganwadi children, dmft, dmfs, Early childhood caries.

I. INTRODUCTION

Primary teeth begin to erupt around the age of six months, and by the age of two, primary teeth are visible in the mouth. Dental caries begin when teeth first emerge in the mouth, hence the danger of dental caries begins at the age of six months.(1)

Early childhood caries (ECC) is defined as the presence of one or more decayed (non-cavitated or cavitated lesions), missed (result to caries), or filled tooth surfaces in the primary tooth in 71 months of age or younger children. Any traces of smooth-surface caries in children less than 3 years of age indicate severe early childhood caries (S-ECC). It is presence the of one or more decayed, missed, and filled smooth surfaces, as well as a decayed, missing, or filled score of 4 for (age 3), 5 (for age 4), and 6 for (age 5).

ECC can develop at any time during one's life, causing damage to the crown of the tooth and eventually exposing the root surfaces of both primary and permanent dentition.The other terms used for ECC are nursing bottle caries and rampant caries. (3)

Toddlers and young children are affected, with indications of tooth decay appearing between the ages of 10 and 48 months (pre-school children or pre-schoolers). It has an impact on the growth, development, and quality of life of many preschool children, as well as their families and communities.(4)

Sugar consumption, poor oral cleanliness, and insufficient fluoride usage are the key risk factors for ECC. Socially deprived groups, as well as indigenous and ethnic minorities, have the greatest prevalence of ECC. A high prevalence is linked to a lack of education and low family income.(5) Changing lifestyle and nutritional trends are dramatically increasing the incidence of caries

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in developing nations like India. Parents are the primary promoter of oral hygiene, and they have a significant impact on their children's eating habits and food choices. Early childhood behavioral patterns are strongly rooted and hard to alter. [6]

These children come from a weaker socioeconomic background and may have poor feeding and eating habits. These children's parents are uninformed about their children's health and have limited access to health facilities and dental care. In this regard, mothers have a significant influence. Mothers of caries-affected children are unaware of several factors that influence caries development. As Anganwadi centers (AWCs) are a part of the Indian public health care system, and Anganwadi workers are the first point of contact for the public with the health system, they can assist in spreading the word about the role of feeding practices in caries formation.[7]

It is important to educate the poor community about oral health issues and dental caries risk factors. There is a constant demand for knowledge on caries prevalence and severity. With this context, the present study was conducted among preschool children attending Anganwadis in Mysuru, Karnataka

II. OBJECTIVES

1. To determine prevalence and pattern of ECC among 3 to 6 years old children attending Anganwadis in Mysuru urban.
2. To determine the associations between feeding practices with early childhood caries.

III. METHODOLOGY

A cross-sectional study was conducted for a period of six months i.e., from Jan 2021 to June 2021, among preschool children attending Anganwadis in the urban field practice areas of JSS Medical College, Mysuru, Karnataka. The sample size was calculated considering the prevalence of ECC of 56.6%[8], the precision of 5%, and confidence interval of 95% and using the formula $n=Z\alpha^{2*} p^{*} q/d^2$, is 377

Institutional Ethics committee approval, permission from Anganwadis centers, and consent from the caregivers were obtained before the start of the study. Children were selected based on multistage sampling. JSS Medical college covers 3 blocks as its field practice area and 2 wards were selected by simple random sampling following a total of 5 AWCs were selected for the study.All children from these AWCs in the age of 3 to 6 years old accompanied by their caregivers were included. A total of 377 children were examined and their caregivers were interviewed for their feeding practices. ECC was diagnosed using the AAPD definition. Dental caries status was recorded using dmft and dmfs indices.

IV. STATISTICAL ANALYSIS:

Data were coded and entered in Microsoft Excel spreadsheet followed by analysis using SPSS version 25 (Licensed to JSSAHER). Descriptive statistics measures were expressed as frequencies, percentages, mean and standard deviation and also represented as tables and graphs as relevant. Crosstables were constructed, and inferential statistics like the Chi-square test were applied for categorical variables, and the statistical significance was evaluated at a 5% level of significance.

V. RESULTS

In our study, out of 377 children, 164 (43.5%) were males and 213 (56.5%) were females. The majority belong to the age of 4 years (28.4%) with a mean (SD) age of 4.52 ±1.08. 49.3% of the children had at least 2 siblings. 71.9% of the caregivers were females/mothers and 98.4% of the primary caregivers were mothers. The majority of the caregivers had completed secondary education (56.2%) followed by primary education (36.3%). 61.8% of the caregivers were homemakers whereas 35.8% were engaged in self-employment and least were in a government job (2.4%). [Table 1]

Out of 377 children, 173 (45.90%) had caries lesions, and 204 (54.10%) were caries-free. The number of caries ranged from 1-7 among those who had caries. [Graph1]

The distribution of ECC according to the number of decayed, missing, and filled teeth showed that out of 550 (total dmft) teeth, 461 (83.8%) were decayed, 82 (14.9%) were missing and filled teeth were 7 (1.2%).The mean (SD) dmftwas found to be 1.9±0.8.[Table 2]

Among those 173 who had caries, 87 (50.3%) were a male child and 86 (49.70%) were female children. The caries was seen more among the children of 4 years (29.5%), followed by children of 6 years (25.4%). The least was noted among children of 3 years (22%).[Table 3]

Inter-arch analysis showed that out of 173 children affected by dental caries, 142 (25.81%) affected the mandibular arch and, 408 (74.18%) affected the maxillary arch.[Graph 2]

Inter-region analysis of ECC showed that maxillary anterior 239(43%) was the most commonly affected region followed by maxillary posterior region 170(31%). Mandibular anterior were the least commonly affected region 3(1%).[Graph 3]

Inter-surface analysis of caries showed that occlusal surfaces were most commonly

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affected 242(52.5%) followed by proximal surface 155(33.62%) and smooth surface was least affected 64(13.88%).[Graph 4]

In our study, 54.5% of those children who were breastfed did not develop ECC and the association between ECC and Breastfeeding was not statistically significant (p-value: 0.05) Duration of breastfeeding ranges from 1 year to 3 years with the highest number of children who had ECC was till 3 years of age (n=64) and least for 1 year (n=3), which was found to be statistically highly significant (p-value≤0.000).62.7% who were bottle-fed developed ECC and this is association is statistically highly significant at a p-value <0.001. Majority of children who were bottle-fed till the age of 3 years 28(93.3%) developed ECC and the least caries were seen among children who were bottle-fed till 1 year of age 6 (54.5%). This was statistically highly significant at a p-value <0.001.[Table 4]

VI. DISCUSSION

The broad objective of the current study was assessing the prevalence of Early childhood caries (ECC) in preschool children attending Anganwadis of 3 to 6 years old in Mysuru urban, Karnataka.

The study comprised 377 children and their caregivers from five Anganwadis that were chosen at random. Early childhood caries were shown to be prevalent in 45.9% of 3 to 6 year old preschool children in this study. A similar trend was reported by Prakasha Shrutha et al.in Kanpur, U.P (48%)[6],Gaidhane et al. in Wardha, Maharashtra (31.9%)[9], S. Koya et al. in West Godavari, Andhra Pradesh (41.9%)[10],Nagrajappa et al. in Bhubaneshwar (37.2%)[11], Priyadarshini et al. in Bangalore (37.3%),[12]Shankara et al. in Hassan rural (38%)[13], Deepti et al.(56.6%) in a previous study done in Mysuru.[8]

The age distribution in our study was skewed towards the 4 years. Out of the children examined 83(22%), 107(28.4%), 95(25.2%), 92(24.4%) were 3, 4, 5, and 6 years old respectively. In our study prevalence of ECC was highest in 4-year-old children (29.5%), Prakash P et.al. discovered a similar pattern in a study done in Bangalore urban.[14]However, this was not in agreement with a study carried out in Northeast Delhi by Rishi Tyagi et.al. where the trend was ECC was increasing with the age.[7] This may be the result of cultural differences in sugar and snack consumption.

Trends of caries were slightly high in males 50.3% than females 49.7%. The results were similar to the study by Rishi Tyagi et.al., in Anganwadis of Northeast Delhi (40.4% males and 36% females)[7]and by Srikanth Koya et.al., in a study done in West Godavari, Andhra Pradesh (44.8% males and 39.9%).[10] The difference in caries experience between males and females might arise due to the socio-cultural factor that females follow personal hygiene more meticulously which may lead to better oral health. These findings opposed those of Deepti Agarwal et al., who showed that ECC affected 56 percent of males and 57.1 percent of females in a previous study done in Mysore city. This could be owing to the wide range of learning settings available. [8]

In the current study, out of 377 caregivers, 271 (71.9%) were female and 106(28.1%) were male respondents. The gender distribution of caregivers may reflect socio-cultural differences where 371 (98.4%) caregivers were mothers. The education level of caregivers was relatively low, 137 (36.3%) had attained primary education and 212 (56.2%) had secondary education. The majority of caregivers were (61.8%) homemakers.

The mean dmft and dmfs in our study were 1.9 0.8 and 2.4 1.39, respectively; prior studies in Kanpur by S P Shrutha et al. found closer dfmt. [6]In underdeveloped nations like Nigeria, Saudi Arabia, Kuwait, and Korea, there is no community fluoride and fewer preventive initiatives. In contrast, in developed countries such as England and the Nordic countries, widespread usage of fluoride in various forms and preventive programmes are used to reduce caries tendencies. [5]

Our study indicated 461(83.8%) of total dmftof 1.9 ± 0.8 were decayed teeth, 82(14.9%) were missing and filled teeth were exceptionally low 7(1.3%). This may be because the majority of the children who attend Anganwadis come from low-income families, and caregivers are unaware of proper oral hygiene procedures. Defective teeth may also be caused by the high expense of dental procedures as well as the limited availability and accessibility of dental services. Similar trends were observed in a study conducted by Rishi Tyagi et.al., in Northeast Delhi, Deepti et.al., in Mysore urban, and Sobha Kuriakose et.al. in Trivandrum.[7][8][15]

The maxillary arch was damaged 74.9 percent more than the mandibular arch (25.8%), according to an inter-arch analysis. A similar result was observed in a study performed by Deepti Agarwal et.al., in Mysuru urban(8) and Dr. Jose et.al., in Kerala,(16), and by AH Wyne et.al., in Saudi Arabia.(17) The carious lesions in the current study were not evenly distributed by the tooth type. The most affected were (43%) deciduous maxillary anterior region. Maxillary posterior (31%) was

slightly more affected than (25%) mandibular posterior. The least affected were (1%) mandibular anterior. Due to the protective mechanism of saliva, the mandibular arch is less subjective to caries. The caries pattern in this population had a high prevalence of ECC in the maxillary anterior region might be due to prolonged breastfeeding and bottle feeding of the child as about 54.1% of children were breastfed till the age of 2 years. Caries involvement in posterior teeth may be the result of consumption of sticky cariogenic foods and snacks. On the contrary, due to the late eruption of deciduous canines, the effect of caries is negligible. The occlusal surface was the most usually affected 52.5 percent of the time in our study, which could be related to ECC affecting the proximal surfaces of anterior teeth.

The role of feeding practices on ECC is a complex and indefinite factor. The duration of breastfeeding is related to the availability of the mothers. 99.2% of the children in our study were exclusively breastfed. This was similar to studies conducted in Tehran, Syria, and Brazil, which revealed that 98 percent, 70 percent, and 70.8 percent of children were breastfed, respectively.Breastfeeding on demand has been implicated as the risk factor of ECC.(18)In our study, children who had breastfed till 2 years (54.1%) and more than 2 years have shown a higher prevalence of ECC. While those who were breastfed less than 1 year (1.1%) developed fewer caries. This might be because maternal breast milk carries protective elements (immunoglobulin and leucocytes) but beyond 1 year these elements progressively reduced. (19)

In the present study, the practice of bottle feeding the child was reported by 37.6%. Bottle feeding for more than two years reported higher ECC (51.1%). With an increase in years of bottle-feeding ECC was progressing. This is in the agreement with the study by OlatosiOO et.al., in South Western Nigeria which also reported that the length of time of bottle feeding is the most important determinant of ECC. (20)

VII. CONCLUSION

The findings of this study back up the notion that the oral health of preschool children in low-income areas is crucial. There is always a need for counseling for caregivers on the oral health of the children.

Recommendation

1. Mobilize community health officers to perform dental check-ups in Anganwadis.
2. Reduce the treatment price for people of low socioeconomic status.
3. Conduct further research to elicit factors influencing ECC in low socio-economic and underprivileged populations.

Limitations

1. As the participants were from 3 to 6 years, some of the caregivers were not able to recollect the information related to feeding practices.
2. Non cavitated lesions were not recorded which may result in underestimation of ECC prevalence.
3. This study was done only under the field practice area of medical college and results may differ in other study settings.

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Conflicts of interest
There are no conflicts of interest

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Table 1: Distribution of study subjects based on Socio-demographic Details

Variables	Category	Frequency (%)
Age of the child (in years)	3	83 (22%)
	4	107 (28.4%)
	5	95 (25.2%)
	6	92 (24.4%)
Gender of the child	Male	164 (43.5%)
	Female	213 (56.5%)
Number of siblings to child	1	151 (40.1%0
	2	186 (49.3%)
	3	39 (10.3%)
	4	1 (0.3%)
Gender of Caregiver	Male/Father	106 (28.1%)
	Female/Mother	271 (71.9%)
Primary caregiver of the child	Mother	371 (98.4%)
	Father	6 (1.6%)

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Marital status	Married	372 (98.7%)
	Widow	5 (1.3%)
Educational status of the caregivers	Primary education	137 (36.3%)
	Secondary education	212 (56.2%)
	Diploma or certificate	28 (7.4%)
Occupational status of the caregivers	Government employee	9 (2.4%)
	Self- employed	135 (35.8%)
	Homemaker	233 (61.8%)

Graph 1: Distribution of children based on the presence or absence of caries

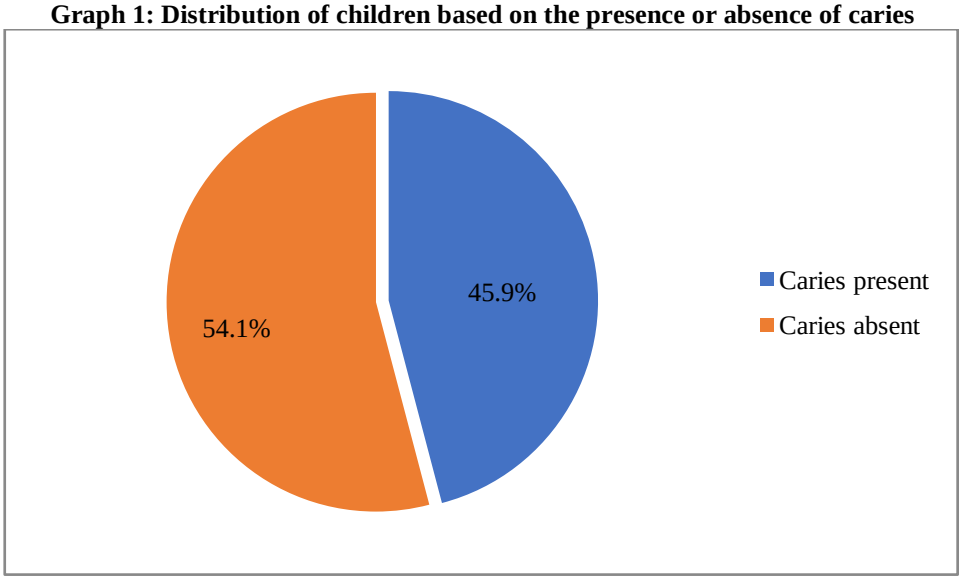

Table 2: Distribution of ECC according to decayed, missing, and filled teeth

dmft Score	No of teeth	Mean	Std. Deviation
Decayed	461	2.66	1.212
Missed	82	1.34	0.574
Filled	7	1.75	0.5
Total dmft	550	1.9	0.8

Table 3: Distribution of children based on the presence or absence of ECC with respect to their gender and age (in years)

Variables	Category	ECC	
		Yes	No
		Frequency (%)	Frequency (%)
Gender	Male	87 (50.3)	77 (37.7)
	Female	86 (49.7)	127 (62.3)
Age (in years)	3	38 (22)	45 (22.1)
	4	51 (29.5)	56 (27.5)
	5	40 (23.1)	55 (27)
	6	44 (25.4)	48 (23.5)

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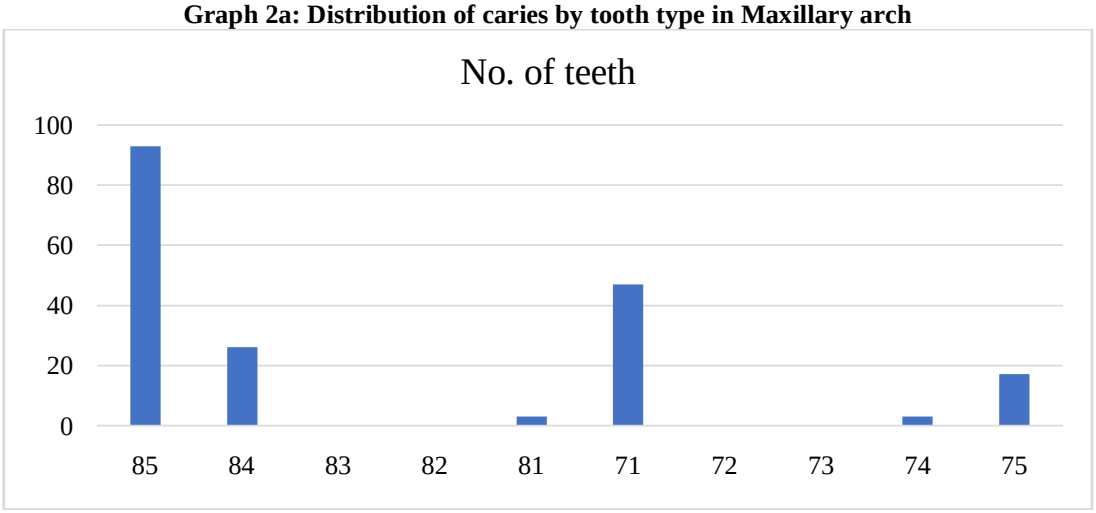
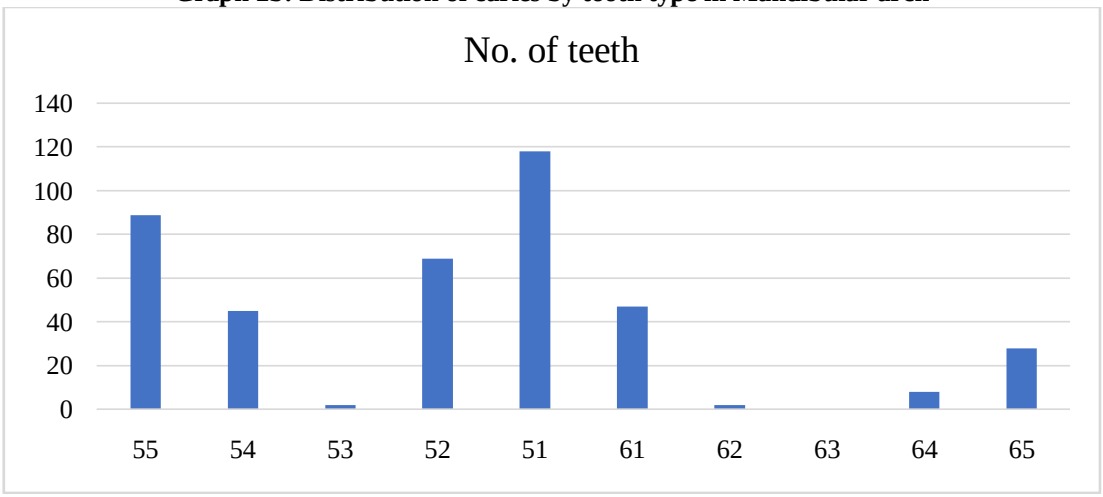
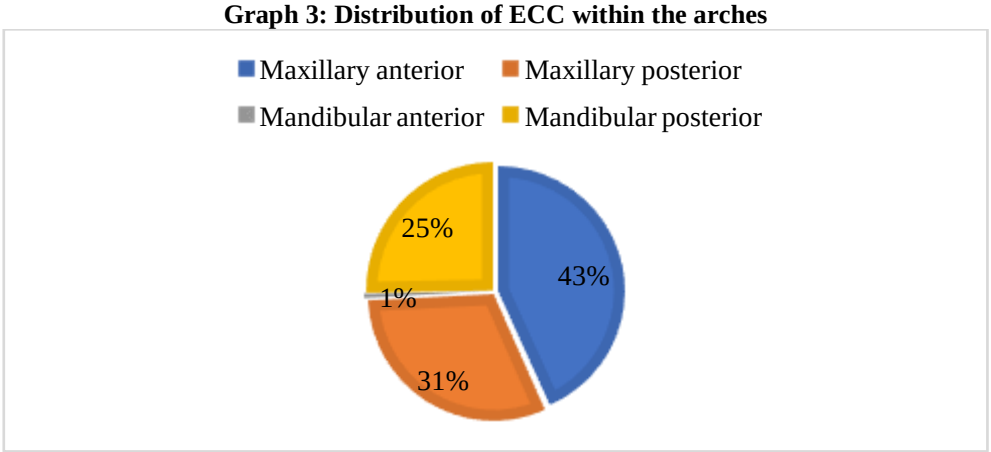
Graph 2a: Distribution of caries by tooth type in Maxillary arch



Graph 2b: Distribution of caries by tooth type in Mandibular arch



Graph 3: Distribution of ECC within the arches



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Graph 4: Distribution of caries according to the surface involved

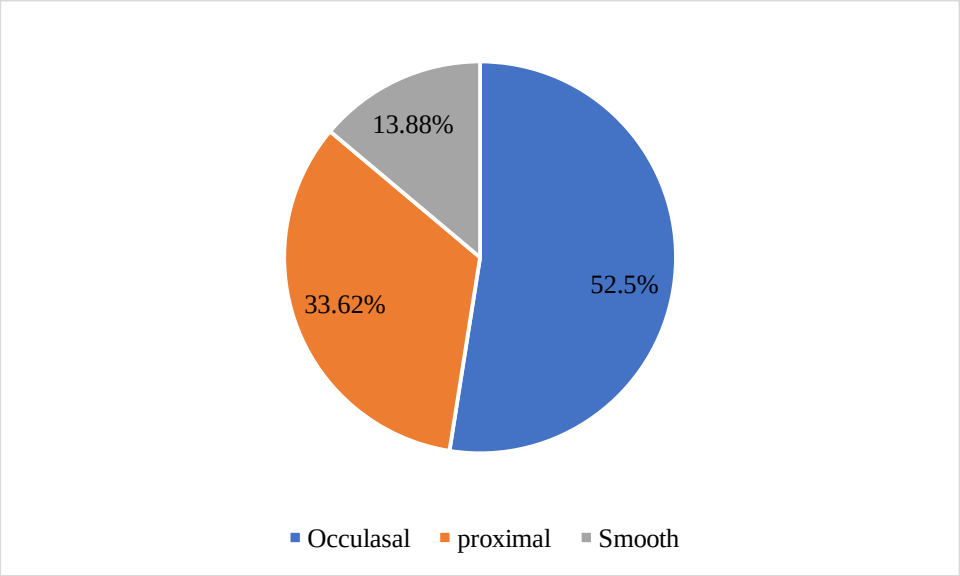

Table 4: Association between feeding practices among children and Early childhood caries (ECC)

Variables	Categories	ECC		Chi-square value(x^2)	df	p-value
		Present (%)	Absent (%)			
Was the child breastfed?	Yes	170(45.5%)	204(54.5%)	3.566	1	0.05
	No	3(100%)	0(0.0%)			
If yes how long(in years)	1	3(75.0%)	1(25.0%)	50.235	4	0.000**
	1.5	27(56.3%)	21(43.8%)			
	2	62(30.4%)	142(69.6%)			
	2.5	17(50.0%)	17(50.0%)			
	3	64(73.6%)	23(26.4%)			
Was the child bottle-fed?	Yes	89(62.70%)	53(37.3%)	37.851	2	0.000**
	No	77(33.80%)	151(66.2%)			
	Don't know	7(100%)	0(0.00%)			
If yes, how long(in years)	1	6(54.50%)	5(45.50%)	18.501	3	0.000**
	2	45(51.10%)	43(48.90%)			
	3	28(93.30%)	2(6.70%)			
	4	10(76.90%)	3(23.10%)			

*Statistically significant (p-value ≤0.05), **statistically highly significant (p- value ≤0.000), df= degree of freedom