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Prevalence of early childhood caries and the associated risk factors among 1-5-year-old children in a Medical Block of Jorhat District, Assam.

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**Conflicts of Interest:** Nil

# Abstract

**Background and Objective:** The objective of this study is to investigate the prevalence and the associated risk factors of early childhood caries (ECC) among 1-5-yearold children in a Medical Block of Jorhat District, Assam. **Materials and methods**: This cross-sectional descriptive study was designed to assess the prevalence of ECC and the associated risk factors among 1-5-year-old children in a Medical Block of Jorhat District, Assam. A total of 400 children between 1-5 years age group and attending various Anganwadi centers were selected for this study. Data collection was done by means of dental examination of children and a standardized questionnaire. The completed questionnaire and proforma were statistically analyzed and evaluated.

**Results:** A total of 400 study participants belonging to 1-5 years age group are enrolled in this study. The mean age of the study participants was 3.45 years. Most of the participants were in the age group of four years (28%).

When gender wise comparison was made girls and boys made almost equal representation with girls comprising 49.50% and boys comprising 50.50%. The overall caries prevalence was 74%. Mean number of decayed teeth is 3.92+3.8 and mean dmft is 4.77+5.23. The risk factors like age, gender, socioeconomic status, mother's education, mother's working status, etc. were assessed for their association with the number of decayed teeth and the dmft index.

**Conclusion:** In the present study the prevalence of ECC was 74% which is relatively high and the mean dmft was 4.77+5.23. A significant association was found between the prevalence of ECC and the mother's working status (p <0.023), mother's education (p<0.001), socioeconomic status (p<0.001) and cleaning method used (p<0.001).

# Keywords: ECC, DMFT, SPSS

### Introduction

Early childhood caries is a cause of serious global concern. It is the most common chronic disease affecting

infants and toddlers. It is a severe form of rampant caries affecting the primary dentition of children below 71 months of age or younger. Unlike dental caries occurring in adults ECC has a multifactorial etiology. One important distinguishing feature of ECC is the absence of decay in the mandibular incisors as they are well protected from the ingested fluids by the tongue. The major risk factors associated with the etiology of ECC can be classified into microbiological factors, dietary factors and environmental factors. In addition to these, several other factors like improper feeding practices, poor socioeconomic conditions, illiteracy, etc. also contribute to ECC. Severe ECC leads to dental pain which disturbs the normal activities of children like eating, sleeping and playing. If left untreated it can also lead to early loss of teeth which can cause functional and esthetic disturbance. Early childhood caries seriously affects a child's well-being, learning ability and quality of life.

There is a wide variation in the prevalence of ECC among different population groups. The prevalence of ECC also varies with several factors like race, culture, ethnicity, socioeconomic status, lifestyle, dietary pattern and oral hygiene habits. The prevalence of early childhood caries is highest in Africa and South-East Asia 1. A high prevalence of ECC has been reported from some Middle Eastern countries, such as Palestine (76%) 2 and United Arab Emirates (83%) 3. The overall prevalence of ECC in India is reported to be 49.6% 4. However, there is a lack of data regarding the prevalence of ECC as no previous studies have been carried out in the Jorhat district of Assam.

Keeping this in mind the present study was carried out to assess the prevalence of ECC and the associated risk factors among 1-5-year-old children in a Medical Block of Jorhat District, Assam.

# Aim & Objective

- To study the prevalence of ECC among 1-5 years old children in a Medical Block of Jorhat district.
- To find out the associated risk factors of ECC.

### **Institutional Ethics Committee**

This study was approved by the Institutional Ethics Committee of Jorhat Medical College, Assam. Before beginning the study, permission was obtained from the Child Development Project Officer of Titabor Block regarding the visit to the various Anganwadi centers and examination of children.

### **Materials & Methods**

This was a community based cross-sectional study carried out in the Titabor Block of Jorhat District, Assam. Jorhat was the last capital of the Ahom Kingdom of Assam. It is an administrative district of Assam located in the central part of the Brahmaputra valley. This district is spread over an area of 2891 sq.km. with a population of 1,092,256 (according to 2011 census). There are seven ICDS blocks under the Jorhat district of Assam. They are East Jorhat, North-west Jorhat, Central Jorhat, Jorhat rural, Jorhat Urban, Koliapani and Titabor. Out of these seven health blocks Titabor block was selected for the present study by lottery method. Under this block there are 235 Anganwadi centers and out of these, 10 centers were selected for this study using lottery method. From each of these center 40 children were selected randomly for the study.

### **Inclusion Criteria**

1. Children between the age group of 1-5 years were included in the study.

2. Children present in the school on the day of examination were included in the study.

### **Exclusion Criteria**

1. Children below one year and above five years were excluded from the study.

 Children suffering from developmental enamel defects like enamel hypoplasia were excluded from this study.
 Mentally challenged children were excluded from this study.

### **Sample Size**

The sample size for the study was calculated by using the formula:

n = z2pq

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d2
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Where n= sample size

P= prevalence

q= 1- p

d= relative error

z= 1.96

Taking 54% as the prevalence of ECC as per the study conducted by Kuriakose et al 5, we have p=0.54 and q=0.46 and considering 5% as the relative error the sample size is calculated to be 400.

This study consisted of a random sample of 400 children, both male and female belonging to 1-5 years age group. The child's mother or the concerned guardian was explained about the nature of the investigation and an informed consent was obtained before enrolling the child. A prior schedule for data collection was prepared and an average of 30-40 children were examined per day. The clinical examination was performed by a sole examiner using disposable mouth mirror and torch light. Gauze pads were used to clean and dry the tooth surfaces. During examination the older children were seated on a chair and infants were examined with their mother's assistance by means of 'knee-to-knee' technique. Dental caries was recorded using WHO criteria 6. Dental examination of the child was followed by a comprehensive interview with the mothers.

The mothers of children attending the Anganwadi centers were informed about the nature of the study either directly or through the teachers. The mothers were interviewed and they filled up a dental health questionnaire which included questions regarding the child's chronological age, birth weight, socioeconomic status, mother's educational status and working status and oral hygiene practices.

#### **Data Analysis**

The data collected was analyzed and calculated using SPSS version 20 software for Windows. The association between ECC and the risk factors was tested using the Kruskal Wallis Test and Mann-Whitney U test.

#### Results

The overall caries prevalence of 400 children of Titabor Medical Block was 74% with a mean dmft of  $4.77 \pm 5.23$ . In the present study the number of children affected with ECC in relation to age, sex, birth weight, socioeconomic status, mother's education, mother's working status and brushing habits was evaluated. Of the total subjects only 26% of the sample population was caries free. Among the total subjects 40% of the children belonged to working mothers. Of the total 400 children examined 50.5% were males and 49.5% were females. The mean dmft of males was higher than females but the P value was statistically not significant. Among the children examined, 7.8% were one year old, 14.2% were 2 years old, 26.5% were 3 years old, 28% were 4 years old and 23.5% belonged to 5 years of age. The highest number of children belonged to the 4year age group. Of the 400 children studied, 121 (30.25%) had low birth weight (<2.5 kg) and 279 had birth weight above 2.5 kg. The results revealed that the prevalence of ECC increased with age, was high in males, in children of non-working mothers and among children who brushed their teeth alone without supervision. The prevalence of ECC was inversely associated with income and mother's education. The prevalence of ECC was not significantly

# Dr. Pinky Goswami, et al. International Journal of Dental Science and Innovative Research (IJDSIR)

associated with birth weight and frequency of tooth brushing.

The overall mean number of decayed teeth was  $3.92 \pm 3.81$ .

Pie chart showing carious and non-carious subjects



Pie chart showing gender wise distribution of subjects

Table 1: Association Of Age With Decayed Teeth AndWith DMFT





Bar chart showing the caries prevalence amongst the age groups

Table 2: Association of Gender With Decayed Teeth AndWith DMFT

Mann Whitney U test at 0.05sigificance level. NS – Not significant



### BAR CHART 2

Males have higher mean number of decayed teeth compared to females

Page 56(

Dr. Pinky Goswami, et al. International Journal of Dental Science and Innovative Research (IJDSIR)

Table 3: Association of Mother's Working Status with Decayed Teeth and with DMFT.

	Mothers working status	N	Mean	Std. Deviation	Test statistic	P Value
DECAVED	Working	162	3.36	3.56		
TEETH	Non- working	238	4.29	3.93	21822	0.023, S
	Working	162	3.96	4.81		
DMFT	Non- working	238	5.31	5.44	22034	0.014, S

Mann Whitney U test at 0.05sigificance level. S – significant

Table 4: Association Of Income With Decayed Teeth AndWith DMFT.

					Kruskal V	Vallis test	Post Hoc Anal	ysis
		N	Mean	Std.	Test	Р	Significant Pairs	Р
				Deviation	Statistic	Value	Significant Faits	value
	Less than 1 lakh	172	3.84	3.72				
DECAYED	1 lakh to 2 lakhs	62	2.54	3.24	13.44	0.001,	1 lakh to 2 lakhs -	0.001,
	More than 2 lakhs	166	4.50	3.99		8	More than 2 lakhs	8
	Less than 1 lakh	172	4.66	5.04				
DMFT	1 lakh to 2 lakhs	62	3.09	4.46	13.88	0.003,	1 lakh to 2 lakhs -	0.001,
	More than 2 lakhs	166	5.51	5.56		s	More than 2 lakhs	s

Kruskal Wallis test at 0.05 significance level. S – Significant

Table 5 : Association Of Mother's Education With No. Of Decayed Teeth & DMFT

		N	Mea n	Std. Dev	Kruskal W	allis test	Post hoc analysis	
			-	200	Statistics	P value	Significant pairs	P value
	No Schooling	65	2.96	3.29			No Schooling	0.005,
	Up to Primary School	121	3.00	3.35		P <	Undergraduate	s
DECAYED	Up to Class X	125	4.47	3.82	23.08	0.001,	Up to Primary School	0.001,
ILLIII	Undergraduate	72	5.38	4.40		HS	Undergraduate	s
	Postgraduate	17	3.76	3.61				
	No Schooling	65	3.49	4.37			More than 1 year	
	Up to Primary School	121	3.68	4.68		<b>P</b> <	More than 4 years up to 5 years	0.006, S
DMFT	Up to Class X	125	5.45	5.30	21.28	0.001,	More than 2 years up to 3	
	Undergraduate	72	6.58	6.12		HS	years – More than 4 years up to 5 years	0.002,, S
	Postgraduate	17	4.7	4.89				

Table 6 : Association Of Cleaning Frequency WithDecayed Teeth And With DMF

				Std.	Kruskal Wa	allis test
	-	N	Mean	Deviation	Test Statistic	P value
	Cleaning once daily	371	3.95	3.86		
DECAYED	Cleaning twice daily	13	2.23	2.97	4.19	0.123,
	Cleaning sometimes	16	4.50	3.07		115
	Cleaning once daily	362	4.83	5.33		0.116,
DMFT	Cleaning twice daily	13	2.53	3.59	4.30	NS
	Cleaning sometimes	16	5.25	4.13		

Kruskal Wallis test at 0.05 significance level .NS – Not





Bar chart showing the mean number of decayed teeth and mean DMFT with respect to cleaning frequency

Table 7: Association of ECC And Supervised Tooth Brushing

				814	Kruskal W	Kruskal Wallis Test		Post Hoc Analysis	
		N	Mean	Deviation	Test Statistic	P value	Significant pairs	P value	
	Cleaning done by child alone	364	4.18	3.84			Cleaning done by		
	Cleaning done by mother	12	2.08	3.26	]		child	child	B-0.001
DECAYED	Cleaning done by child under supervision	24	0.75	1.25	27.33	HS	Cleaning done by child under supervision	HS	
	Cleaning done by child alone	364	5.11	5.33			Cleaning done by		
	Cleaning done by mother	12	2.25	3.72		P< 0.001.	child alone-	P< 0.001.	
DMFT	Cleaning done by child under supervision	24	0.87	1.32	25.89	25.89	HS	Cleaning done by child under supervision	HS





Bar chart showing the mean number of decayed teeth and mean dmft with respect to cleaning method

Page **D** (

Table 8 : Demographic Description Of The Sample DataVariables: Categorical Variables

		Frequency	Percent	P Value	
OFNIDED	FEMALES	198	49.5%	0.041 NO	
GENDER	MALES	202	50.5%	0.841, NS	
	Less than 50000	4	1.0%		
DICOME	50000 to 1 lakh	168	42.0%	<b>P</b> < 0.001,	
INCOME	1 lakh to 2 lakhs	62	15.5%	HS	
	More than 2 lakhs	166	41.5%		
	No schooling	65	16.3%		
MOTUEDO	Upto primary school	121	30.3%	<b>D</b> < 0.001	
EDUCATION	Upto Class 10	125	31.3%	P < 0.001,	
LDOCATION	Undergraduate	72	18.0%	нз	
	Post graduate	17	4.3%		
MOTHERS	MOTHERS Working		40.5%	<b>P</b> < 0.001,	
OCCUPATION	Non working	238	59.5%	HS	

Chi Square test at 0.05 significance level. NS – Not Significant. HS – Highly Significant

#### **Continuous Variables**

	N	Mean	Std. Deviation
AGE	400	3.45 years	1.21 years
BIRTH WEIGHT	400	2.94 Kgs	1.57 Kgs

### Discussion

Early childhood caries is the most common chronic disease affecting infants and toddlers. Although largely preventable, negligence and lack of awareness among the masses has contributed to its high prevalence. Early childhood caries has a multifactorial etiology.

The present study was carried out in the Titabor block of Jorhat District, Assam. This cross- sectional study was carried out among 400 children of 1-5-year age group. The overall prevalence of ECC in the present study was 74% with a mean dmft of  $4.77 \pm 5.23$ . A high prevalence of 87.5% was reported in a similar study carried out by Jain R et al 7. An important finding of this study was that there was not a single restored tooth and for most of the children it was their first dental check-up. This indicates a total lack of awareness about oral health care among parents and a lack of accessibility and affordability for dental treatment in this section of people. The high prevalence reported in the present study could be due to the fact that Titabor is basically a semi-rural area where agriculture is the chief occupation. Majority of the

children were breast fed and the duration of breast feeding was for almost three years. Prolonged breast feeding is associated with an increased risk of dental caries. Studies have shown that human milk has more cariogenic properties as it is high in carbohydrates and low in calcium, phosphorus and protein 8,9.

### Association of age with ECC

The results of the present study revealed that the prevalence of dental caries increased with age. The highest prevalence of 29.70% was recorded in the above 4 years and up to 5 years age group [**Bar chart 1**]. The highest mean dmft of 6.91 was also recorded in this group [**Table 1**]. Similar results have been reported in studies carried out by Prakash P 10 and Vandana K. et al11. The increase in prevalence of dental caries with age was explained by the fact that with increasing age the number of erupted teeth increases and as a result the number of teeth exposed to the cariogenic environment also increases.

### Association of ECC With Gender

The study sample comprised of 202 boys and 198 girls **[Table 2]**. In this study it was observed that boys have higher mean dmft than girls, however this difference was not statistically significant. Similar results have been obtained in other studies 12,13 where boys have shown higher mean dmft than girls. In another study carried out by Ghangas M 14 no significant correlation was observed between ECC and gender.

### ECC AND WORKING STATUS OF MOTHER

In the present study prevalence of ECC was evaluated with the working status of the mothers, and it was observed that the prevalence was high among children of non-working mothers **[Table 3]** Similar results were observed in a study carried out in Indonesia by Suri et al 15 where the children of working mothers had a lower dmft than the children of non-working mothers. In another study by Al Jehara et al 16 no statistically significant difference was found between the children of working and non-working mothers.

### Socioeconomic Status of parents

To study the association between ECC and socioeconomic status, the children were divided into three groups based on their parent's annual income [**Table 4**]. In terms of income the association with decayed teeth and dmft was statistically significant with significant difference between the income groups '₹1 lakh – ₹2 lakh' and 'More than ₹2 lakh' where value of P = 0.001. In the present study it was observed that ECC was inversely associated with socioeconomic status. Similar findings were reported by Walter J Psoter et al 17. High socio-economic status may increase the risk of ECC in many ways as sweets and other refined carbohydrates becomes easily affordable and their frequency of consumption also increases. This may lead to poor unhealthy food habits in children 18.

### **ECC And Mother's Education**

The mothers are considered to be the primary caregivers in a family and they are largely responsible for the behaviour and habits of the children. In the present study it was observed that prevalence of ECC was inversely associated with mother's education. There was statistically significant difference between 'No schooling and Undergraduate' and 'Up to primary school and Undergraduate' groups [**Table 5**] Low maternal education is related to higher caries prevalence in their children. Similar results were obtained in a study by Bharadwaj et al 19 where an inverse relationship between the education level of mother and the caries status of their children.

#### **ECC and Cleaning Frequency**

The association between ECC and the cleaning frequency was studied and it revealed that among the 400 children studied, 371 children brushed their teeth only once a day, 13 children brushed twice daily and 16 children brushed

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their teeth only occasionally. The mean dmft was lowest in the group who brushed two times a day. **[Table 6] & [Bar chart 3]** The P value was not significant for the association between ECC and cleaning frequency. In this study majority of the children brushed their teeth once only. Similar results have been reported by Sharma K et al and Jain et al where they found that children who brushed their teeth twice daily had the least prevalence of dental caries. In a study carried out by Boustedt K et al 20 it was observed that frequency of toothbrushing during preschool years was a significant determining factor of caries prevalence at 5 years. However, in another study by Percival T. et al 21 it was observed that there was no association between ECC and frequency of brushing or type of cleaning agent used.

#### ECC and Supervised Tooth Brushing

In the present study the cleaning methods were divided into three categories. In all the three categories toothbrush and toothpaste was used for brushing teeth. **[Table 7]** Children who cleaned their teeth alone without supervision had the highest mean number of decayed teeth of  $4.18 \pm 3.84$ .

In terms of cleaning method, the association with decayed teeth was statistically highly significant (p < 0.001) with highly significant difference in decayed teeth between the groups 'Cleaning done by child alone' and 'Cleaning done under supervision' (p < 0.001). [Table 7] The association of cleaning method with dmft is statistically highly significant (p < 0.001) with highly significant difference in dmft between the groups 'Cleaning done by child alone' and 'Cleaning done under supervision' (p < 0.001). Thus, higher caries is observed amongst children who clean their teeth alone without supervision. Similar results have been obtained in several other studies 22, 23 and have concluded that supervised toothbrushing with fluoride toothpaste can be effectively targeted into socially

deprived communities and a significant reduction in dental caries can thereby be achieved especially among caries susceptible children. However, results from another study24 has revealed that supervision during toothbrushing alone does not affect the caries status of the children.

#### Conclusion

From this study we can conclude/presume that the prevalence of ECC is associated with certain factors like age of the child, educational status of mother, working status of mother and supervision during toothbrushing. The relatively high prevalence of ECC can be reduced by adopting certain measures. The period of breast feeding should not be prolonged and the child should be weaned at the age of one year. Parents should be motivated about the importance of primary teeth and they should be encouraged to bring the child for regular dental check-ups. The parents should be advised to supervise their child during toothbrushing. The habit of cleaning teeth after each meal should be instilled in children from the beginning. Oral health check-ups should be included in the curriculum of Anganwadi centres.

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