

Evaluation of Factors Influencing the Oral Health-related Quality of Life among Children with Early Childhood Caries: A Cross-sectional Study

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ABSTRACT

Aim: To evaluate the factors that affect the oral health-related quality of life (OHRQoL) among children with early childhood caries (ECC).

Materials and methods: A total of 340 children aged between 3 and 6 who were diagnosed with ECC were enrolled in the study. Parents accompanying the children completed a questionnaire on the sociodemographic status and filled out the Early Childhood Oral Health Impact Scale (ECHOHIS) for the evaluation of OHRQoL. Data were recorded, tabulated, and statistically analyzed.

Results: The study population consisted of 189 (55.6%) boys and 151 girls (44.4%). A total of 96.4% had cavitated lesions; 31.2% of the children had pain at the time of evaluation. A significant association was seen between the Decayed Missing Filled Teeth (DMFT) score of the child ($p < 0.001$). Pain at the time of evaluation and DMFT status had a significant association with the ECHOHIS ($p < 0.001$).

Conclusion: Early childhood caries was found to impact the OHRQoL. Pain, visible dental plaque, family income, and parental education were found to be determinants that affect the OHRQoL.

Clinical significance: Early childhood caries significantly reduces the OHRQoL of children and their families. Pain, visible dental plaque, family income, and parental education were found to influence the OHRQoL. Teaching parents the importance of oral health and preventive treatment will help prevent the occurrence of ECC.

Keywords: Early childhood caries, Oral health-related quality of life, Oral hygiene, Plaque.

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INTRODUCTION

Early childhood caries is one of the most prevalent chronic diseases affecting infants and toddlers all over the world. Early childhood caries is defined as the presence of one or more decayed (cavitated or non-cavitated), missing or filled tooth surfaces due to caries in any primary tooth in a child less than 5 years.¹ Early childhood caries is a multifactorial disease that occurs due to the presence of sugar-rich diet, *Streptococci mutans*, structural defects of the primary tooth, and socioeconomic factors. Among the chronic diseases affecting children globally, ECC is now the most common to be reported with the highest prevalence in being reported in disadvantaged communities.^{1,2}

Early childhood caries usually begins as a white spot on the maxillary primary incisors. If the child continues to have a cariogenic diet coupled with poor oral hygiene, definitive destruction of the primary incisors occurs and starts to affect the primary molars in the sequence of tooth eruption.³ Children with ECC have been found to be suffering from multiple health problems, most often reporting pain, infections, and abscesses. Children have difficulty in eating due to pain, resulting in a decreased weight and body mass index compared to caries-free children. Studies have shown that children are found to be irritable and have low self-confidence with disturbed sleep patterns.⁴ Children with ECC have shown poor academic performance, frequent hospitalizations, and multiple visits to the emergency room which in turn lead to missed school days. Parents often have to take time off work for a hospital and dental visits. Thus, both children and parents are affected resulting in poor quality of life.^{1,5}

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Children with ECC are below 6 years and report to the dental office with the need for aggressive treatment. Due to their young age and lack of cooperative ability, these children are not the best candidates to be treated on the dental chair, as they would require multiple appointments, and cooperation for treatment cannot be expected.^{1,2} Hence, to achieve the most optimal results, children undergo full mouth rehabilitation under general anesthesia.

Treatment is completed in a single appointment and is discharged on the same day. After treatment, children have reported improved quality of life. Despite high success rates, treatment has been found to relapse and affect the quality of life again.^{6,7}

The presence of ECC has a profound effect on the quality of life, impairing both daily activities and general health. Parents may not consider oral health as a part of general health. Parents usually visit a dentist when the child complains of pain rather than scheduled visits every 6 months.^{2,5} Although various studies and systematic reviews have shown that children with ECC have poor OHRQoL, very few studies have explored the factors which influence it.⁶⁻⁸ Due to the high propensity for caries recurrence after full mouth rehabilitation under general anesthesia, it is important to understand the factors affecting the quality of life and inculcate it into preventive programs to improve the quality of life of both children and parents. A study by Hooley et al.⁹ stated that the role of individual factors such as biology and diet are well-established facts for the etiology of ECC. Recently, empirical attention has been shifted to the relationships between major ecological influences such as income, ethnicity, and education. The major intermediary mechanism is parental influences. This primacy of the parent in governing the child's proximate environment and the likelihood of the child endorsing adaptive or maladaptive health attitudes, beliefs, and behaviors related to the development of ECC. A systematic review by Chouchene et al.¹⁰ parenting stress or some of its domains influence the development of carious lesions in young children.

Various instruments have been used to assess the OHRQoL of children suffering from ECC using different scales. The ECOHIS is a validated tool used to measure the impact of oral health on children from a family standpoint. This tool has 13 questions divided into two domains: Nine questions about parent's perception regarding the impact of oral health on children and four questions about the impact on the family.^{2,8} Hence, this study was undertaken to evaluate the OHRQoL of children with ECC and the factors influencing it.

MATERIALS AND METHODS

This study received approval from the Institutional Human Ethical Committee Reference No.: IHEC/SDC/FACULTY/21/PEDO/225]. All participants were examined at the Department of Pediatric and Preventive Dentistry. Children below 6 years with no systematic diseases and diagnosed with ECC were eligible to participate in the study. Children who were unable to cooperate with the clinical examination were excluded from the study. The objectives of the study were elucidated in detail to the parents in both English and regional languages (Hindi, Tamil, Telugu, Kannada, and Malayalam). Parents were given opportunities to ask doubts about the study and informed that participation was voluntary. Informed, written and video consent was obtained from interested parents whose children were recruited for the study.

Sample power was calculated using the G*Power sample power calculator (Universität Kiel, Kiel, Germany), using a previous study published by Lai et al.⁸ Expecting a 90% response rate for the study, a total of 340 patients were enlisted.

The children were then examined by two examiners, who were both calibrated and trained for clinical examination. Every patient was asked if they were experiencing dental pain. The presence and absence of pain were noted. A mouth mirror and

dental explorer were used for carrying out the dental examination. Sound, DMFT were recorded, based on the recommended World Health Organization criteria for the visual assessment of dental caries. Plaque scores were recorded using the visible plaque index (VPI), which was calculated by dividing the number of sides with a dental plaque by the total number of sites examined and multiplied by 100.

Parents were asked to fill out a questionnaire about the demographic details and characteristics of their children. After obtaining the required details, ECOHIS was completed by the parents. All questionnaires were in English. If the parents could not understand English, the questionnaire was verbally translated into a language that parents could understand using a certified translator and then filled.

Intra- and inter-examiner reliabilities were determined using intra-class correlation coefficients. Thirty-five participants were randomly selected for a repeat examination to assess the intra- and inter-examiner reliability of the DMFT and VPI measurements.

Data analyses were performed using a statistical package for the social sciences (SPSS) statistics for MS Windows, version 25.0 (IBM Corp, USA). Descriptive statistics and frequency distribution tables were used to obtain the mean domain scores of ECOHIS for each parent and child characteristic were analyses. Independent sample's *t*-tests were used to compare mean domain scores of ECOHIS between two groups. One-way analysis of variance (ANOVA) with Turkey's *post hoc* pairwise comparisons were used to compare mean domain scores of ECOHIS among three groups. To assess the relationship between ECOHIS and the explanatory variables, all variables were simultaneously entered into the model and multiple linear regressions were performed.

RESULTS

All 340 children were diagnosed with ECC and all their parents (100% response rate) completed the responses.

The intra-class coefficient scores for intra-examiner and inter-examiner reliability of the clinical examination have been described in Table 1. The intra-class correlation coefficient score was above 0.98 for both DMFT and VPI.

Table 2 describes the characteristics of children and parents enrolled in the study. Out of the 340 children, 189 (55.6%) were boys and the remaining 151 were girls (44.4%). Children were aged between 3 and 6 years with a mean age of 4.4 ± 0.6 years. The majority of the patients were accompanied by their mothers (75.3%). Also, 85.9% of the parents had educational levels up to secondary level school education. Only 14.1% of the parents had post-secondary-level education or above. The majority of the families (61.5%) had a yearly income below 200,000 INR. Furthermore, 30.9% of the families had an annual income between the range of 200,000 and 500,000 INR and the remaining 8.7% of families reported annual incomes greater than 500,000 INR a year. Moreover, 96.4% had cavitated lesions. A total of

Table 1: Intra- and inter-examiner reliability (intra-class coefficient scores) of the clinical examination

	Intra-examiner reliability		Intra-examiner reliability
	Examiner A	Examiner B	
DMFT	1.00	1.00	0.99
VPI	0.99	0.99	0.98

Table 2: Parent and child characteristics

Parent and child characteristics	Frequency	Percentage
<i>Parent demographics</i>		
Relationship to the child		
Mother	256	75.3
Father	86	24.7
Education level		
Secondary or below	292	85.9
Post-secondary or above	48	14.1
Family income (per year)		
<200,000 INR	209	61.5
200,000–500,000 INR	105	30.9
>500,000 INR	26	8.7
<i>Child demographics</i>		
Gender		
Male	189	55.6
Female	151	44.4
<i>Child's dental status</i>		
Decayed teeth (d)		
None	8	2.4
One or more	332	96.4
Missing teeth (m)		
None	343	92.1
One or more	27	7.9
Filled teeth (f)		
None	315	92.6
One or more	25	7.4
DMFT		
<7	80	23.5
7–13	179	52.6
>14	81	23.9
VPI		
<90%	139	40.9
≥90%	201	59.1
Presence of pain		
No pain	234	68.8
Pain at evaluation	106	31.2

7.9% of the children had missing teeth due to caries and 7.4% of children had filled teeth. About 59.1% of the children had VPI greater than 90%. Also, 31.2% of the children had pain at the time of evaluation.

Table 3 represents the ECOHIS responses of the parents. A total of 74.4% of the parents reported that their child had previously experienced tooth-related pain; 62.3% of parents reported that children had experienced difficulty eating because of dental problems. Moreover, 21.2% of the patients had missed school or daycare at some point due to ECC; 56.7% of patients were reported to be frustrated due to ECC; 76.2% of parents had to take time off from work for dental problems or treatment; and 78.8% of the parents felt that ECC had a financial impact on their family.

Table 4 describes the association between the various parent and child characteristics with the different domains of ECOHIS scores. The caretaker's relationship to the child had an association

($p < 0.05$) with the family distress domain. Mothers who filled in the questionnaire had a higher family distress domain score compared to fathers. A significant association ($p < 0.001$) between the parent's education level and the child's self-image domain. Parents with less education had a higher child's self-image domain score. The DMFT score of the child was associated with almost every ECOHIS domain except the self-image domain. The higher the DMFT, the higher the domain score. The DMFT scores were in particular associated with the child impact, child function, family impact, and family distress domains ($p < 0.001$).

Table 5 represents the multiple regression table. Child impact, family impact and ECOHIS scores were used as dependent variables for multiple regression. The DMFT score and the presence of pain showed a significant association ($p < 0.001$) with each of the three variables.

With the results of the study, it was observed that pain, visible tooth plaque, family income, and parental education all had an influence on the OHRQoL.

DISCUSSION

Despite being completely preventable, ECC continues to be the most prevalent chronic disease of childhood today. The prevalence of ECC is continuously rising and is now considered a major public health issue.¹¹ Early childhood caries is now as the best predictor for caries in permanent dentition and is found to have deleterious effects on growth unless treated. Children with ECC continue to grow at a slow speed due to inadequate nutritional intake to meet their daily metabolic needs.¹² The prevalence of ECC in India has been found to be 49.6% in a recently published systematic review. All states were found to have a prevalence of more than 40% with Andhra Pradesh, India having the highest prevalence of 63%.¹³ Oral health-related quality of life is an important part of general health and wellbeing and is now recognized as an important sector of the Global Oral Health Program of the World Health Organization.¹⁴ The assessment of OHRQoL has become popular over the years as clinical indicators do not completely portray the attributes of oral health. The presence of oral diseases has been found to produce an adverse effect on the general and psychological health of both children and their parents.¹⁵ Measuring the quality of life provides reasonably efficient suggestions for bureaucrats and academics as they look at factors that can affect and improve the daily lives of patients.^{2,14,15}

Early childhood caries has been associated with a poor quality of life.¹⁵ Although ECC begins as a white spot lesion, children often report to the dental office when pain occurs and definitive decay is visible. Unmet dental treatment needs in ECC can worsen the situation for both the child and their family.¹ Longstanding carious lesions may result in pulpitis and abscesses which result in further reduction in their OHRQoL. Due to pain, children have difficulty eating. When compared to healthy children, children with ECC were found to be lesser in weight.¹⁴ Since children with ECC eat less, they are usually malnourished, susceptible to various acute and chronic infections, and at high risk of hospitalization. Children affected by ECC have also been found to be anemic, and irritable with the inability to concentrate in school leading to poor academic performances.^{1,2,5,16}

Out of the 340 children who participated, 96.4% had untreated decayed teeth. This is similar to various studies which have shown that children with higher untreated dental decay often report with low OHRQoL.^{2,8,17} 31.2% of the children had pain at the time of

Table 3: The ECOHIS responses

Impact	Responses, n (%)				
	Never	Hardly ever	Occasionally often	Often	Very often
<i>Child impact</i>					
1. How often has your child had pain in the teeth, mouth, or jaws?	45 (13.2)	42 (12.4)	189 (55.6)	54 (15.9)	10 (2.9)
2. How often has your child had difficulty drinking hot or cold beverages because of dental problems or dental treatments?	146 (42.9)	84 (24.7)	88 (25.9)	12 (3.5)	10 (2.9)
3. How often has your child had difficulty eating some foods because of dental problems or dental treatments?	128 (37.6)	62 (18.2)	117 (34.4)	27 (7.9)	6 (1.8)
4. How often has your child had difficulty pronouncing any words because of dental problems or dental treatments?	212 (62.4)	87 (25.6)	29 (8.5)	7 (2.1)	5 (1.5)
5. How often has your child missed preschool, day care, or school because of dental problems or dental treatments?	235 (69.2)	48 (14.1)	39 (11.5)	13 (3.8)	5 (1.5)
6. How often has your child had trouble sleeping because of dental problems or dental treatments?	189 (55.6)	74 (21.8)	67 (19.7)	6 (1.8)	4 (1.2)
7. How often has your child been irritable or frustrated because of dental problems or dental treatments?	138 (40.6)	52 (15.3)	123 (36.2)	13 (3.8)	14 (4.1)
8. How often has your child avoided smiling or laughing when around other children because of dental problems or dental treatments?	206 (60.6)	86 (25.3)	32 (9.4)	10 (2.9)	6 (1.8)
9. How often has your child avoided talking with other children because of dental problems or dental treatments?	199 (55.8)	74 (21.8)	56 (16.5)	7 (2.1)	4 (1.2)
<i>Family impact</i>					
10. How often have you or another family member been upset because of your child's dental problems or dental treatments?	60 (17.6)	39 (11.5)	169 (49.7)	56 (16.5)	17 (4.7)
11. How often have you or another family member felt guilty because of your child's dental problems or dental treatments?	73 (21.5)	39 (11.5)	147 (43.2)	55 (16.2)	26 (7.6)
12. How often have you or another family member taken time off from work because of your child's dental problems or dental treatments?	81 (23.8)	72 (21.2)	162 (47.7)	21 (6.2)	4 (1.2)
13. How often has your child had dental problems or dental treatments that had a financial impact on your family?	73 (21.5)	97 (28.5)	135 (39.7)	23 (6.8)	12 (3.5)

Table 4: Association between various parent and child characteristics and different domains of ECOHIS scores [mean, standard deviation (SD)]

Parent and child characteristics	Domains of ECOHIS							
	Child impact	Symptom	Child function	Psychological	Self-image	Family impact	Distress	Family function
<i>Parent demographics</i>								
Relationship to the child ^a								
Father	7.57 (5.11)	1.94 (0.89)	3.21 (2.74)	2.01 (1.91)	1.01 (1.47)	6.79 (3.48)	3.84 (2.19)	2.78 (1.84)
Mother	7.09 (4.76)	1.67 (0.92)	3.17 (2.58)	1.95 (1.76)	0.85 (1.06)	6.17 (3.14)	3.24 (2.32)	2.93 (1.65)
Education level ^a					***			
Secondary or below	8.21 (5.62)	1.91 (0.94)	3.45 (3.02)	1.98 (1.84)	1.09 (1.54)	6.56 (3.42)	3.65 (2.16)	3.02 (1.76)
Post-secondary or above	6.79 (5.82)	1.72 (1.03)	2.66 (2.51)	1.82 (1.76)	0.67 (1.02)	6.41 (3.59)	3.83 (2.51)	2.79 (1.83)
Family income per year ^b	*							
<200,000 INR	8.32 (5.98)	1.92 (1.06)	3.32 (3.15)	2.06 (1.92)	1.10 (1.52)	6.78 (3.46)	3.75 (2.26)	3.01 (1.88)
200,000–500,000 INR	7.46 (4.53)	1.71 (0.92)	2.94 (2.13)	1.79 (1.76)	1.03 (1.46)	6.62 (3.21)	3.91 (2.26)	2.82 (1.67)
>500,000 INR	5.26 (5.41)	1.63 (1.11)	1.91 (2.53)	1.26 (1.58)	0.68 (1.53)	5.26 (3.39)	2.82 (2.13)	2.45 (1.59)
<i>Child demographics</i>								
Gender ^a								
Male	7.73 (5.81)	1.85 (1.07)	3.26 (3.02)	1.89 (1.87)	1.15 (1.47)	6.29 (3.17)	3.41 (2.35)	2.86 (1.85)
Female	7.86 (4.88)	1.92 (1.01)	3.11 (2.71)	1.95 (1.68)	1.26 (1.35)	6.63 (3.38)	3.93 (2.23)	2.91 (1.76)
<i>Child's clinical disease status</i>								
<i>Decayed teeth^a</i>								
None	5.11 (5.62)	1.34 (1.01)	1.56 (1.98)	1.17 (1.21)	1.55 (1.83)	5.08 (3.25)	3.12 (1.49)	2.14 (1.95)
One or more	7.83 (5.53)	1.93 (1.13)	3.12 (2.74)	1.89 (1.77)	1.12 (1.57)	6.88 (3.45)	3.76 (2.48)	2.96 (1.69)
<i>Missing teeth^b</i>								
None	7.45 (5.62)	1.86 (1.02)	3.16 (2.81)	1.97 (1.85)	1.22 (1.31)	6.71 (3.44)	3.85 (2.27)	2.97 (1.81)
One or more	8.32 (5.71)	2.17 (0.95)	2.65 (2.42)	2.09 (1.66)	1.66 (1.93)	6.34 (3.16)	3.18 (1.98)	3.19 (1.59)
<i>Filled teeth</i>								
None	7.95 (5.59)	1.86 (1.02)	3.42 (2.84)	1.84 (1.85)	1.05 (1.42)	6.68 (3.46)	3.73 (2.25)	2.89 (1.81)
One or more	7.33 (6.27)	1.94 (1.03)	2.82 (2.98)	1.79 (1.96)	0.95 (1.62)	6.75 (3.52)	3.56 (2.31)	3.29 (1.92)
DMFT ^b	***	**	***	*		***	***	*
<7	6.31 (4.78)	1.49 (1.06)	2.51 (2.42)	1.46 (1.65)	1.03 (1.49)	5.56 (3.23)	3.12 (1.95)	2.63 (1.75)
7–13	7.53 (5.31)	1.94 (1.01)	2.93 (2.73)	1.95 (1.81)	0.96 (1.32)	6.45 (3.51)	3.56 (2.29)	2.93 (1.79)
>14	9.65 (6.08)	2.09 (1.03)	4.16 (3.05)	2.32 (2.01)	1.42 (1.85)	7.84 (3.01)	4.56 (2.06)	3.36 (1.89)
VPI ^a	*		**					
<90%	6.84 (4.72)	1.79 (1.01)	2.64 (2.36)	1.77 (1.73)	1.02 (1.15)	6.38 (3.19)	3.69 (2.29)	2.79 (1.82)
≥90%	8.51 (5.82)	1.88 (1.05)	3.41 (2.95)	1.98 (1.79)	1.11 (1.34)	6.71 (3.56)	3.84 (2.65)	2.97 (1.88)
Presence of pain ^a	***	***	***	***		***	**	**
No pain	6.82 (5.43)	1.69 (1.03)	2.76 (2.68)	1.59 (1.76)	1.05 (1.51)	6.27 (3.56)	3.49 (2.21)	2.73 (1.82)
Pain at evaluation	9.95 (5.27)	2.36 (0.89)	3.95 (2.98)	2.67 (1.85)	1.23 (1.56)	7.71 (3.12)	4.27 (2.02)	3.42 (1.76)

^aIndependent sample's t-test. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; ^bOne-way ANOVA. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$



Table 5: Multiple regression analysis: ECOHIS scores for the various parent and child characteristics

Variable	Unstandardized coefficient	Standard error	p-value
<i>Child impact^a (adjusted R² = 0.129)</i>			
Intercept	6.911	2.018	<0.001***
DMFT	3.109	0.071	<0.001***
Presence of pain	3.278	0.746	<0.001***
<i>Family impact^b (adjusted R² = 0.094)</i>			
Intercept	4.089	0.523	<0.001***
DMFT	0.198	0.056	<0.001***
Presence of pain	1.734		<0.001***
<i>ECOHIS^c (adjusted R² = 0.153)</i>			
Intercept	8.136	1.853	<0.001***
DMFT	0.524	0.089	<0.001***
Presence of pain	4.833	0.873	<0.001***

^aExcluded variables: Relationship to the child, child's age, parental education level, family monthly income, child's gender, and VPI score; ^bExcluded variables: Relationship to the child, child's age, parental education level, family monthly income, child's gender, and VPI score; ^cExcluded variables: Relationship to the child, child's age, parental education level, family monthly income, child's gender, VPI score; ***p < 0.001.

examination and 86.8% had experienced pain with the decayed tooth at some point in time. This is also similar to previously published studies which show that pain is an indicator of poor OHRQoL.^{8,18} When left untreated, abscesses and fistulas can occur which can further deteriorate OHRQoL. Shanbhog et al. stated that despite the presence of cavitated lesions, many parents in low- and middle-income countries do not seek treatment due to inaccessibility, lack of awareness, and unaffordability.¹⁹ Parents have been found to mostly seek medication for symptomatic relief rather than treatment for primary teeth as they feel primary teeth will shed soon.¹⁸ Preventive services such as pit and fissure sealants and topical fluorides are rarely utilized.²⁰

Only 2.4% of patients had non-cavitated lesions. Very low priority is given to the non-cavitated lesions in children below 6 years. Although active surveillance of non-cavitated lesions has been recommended, very few parents follow the regimen of dental visits every 6 months and use preventive dental services. Children are brought to a dentist usually after visible dental decay occurs. Corrêa-Faria et al. have recommended continuous monitoring along with the use of fluoride varnishes and sealants for occlusal surfaces.²¹

A total of 85.9% of the parents in the study had educational levels below the secondary level. Parental education level is an important factor in impacting the occurrence of dental caries in preschoolers. An individual's educational qualification is considered to be the best predictor of health behavior when compared with other criteria such as salary and occupation.²² Caregiver educational status has been shown to have a significant association with dental check-up visits, the intensity of tooth brushing, and the prevalence of decayed teeth. Low caregiver educational levels have been associated with untreated dental caries in children. Parents with higher educational levels were found to access preventive oral health care measures.^{1,2,23} According to Heima et al.,²² microbiological variables, such as early cariogenic bacteria colonization and defensive factors such as fluoride, lie in the path between the educational level of parents and the caries status of children. Hence, parental education plays an indispensable role in the pathway of caries progression. Preschoolers whose parents have low education levels had increased odds to develop caries, compared with those children whose parents had higher

education. Parents with higher education may also have better knowledge of dental health, which could be the possible rationale for their children having better oral. Our study is in accordance with studies published by Lai et al. in Hong Kong,⁸ Hamasha et al.²⁴ in Iowa, and Albert et al.²⁵ in Manhattan which concluded that the education level of parents was associated with caries status of their children. According to Astrom and Kiwanuka,²⁶ parents with lower educational levels had weak intentions to control the sugar intake of children and less positive attitudes towards dental treatment in comparison to educated parents. Mothers with a low level of education have been linked with decreased dental use of oral health services.¹⁷ Parents play an important role in their children's oral health in the initial years, hence educating parents at the earliest can help in the prevention of caries and improvement of OHRQoL.

A total of 61.5% of the parents in this study had an annual income of less than 200,000 INR a year. Mathur et al.²⁸ found that children living in slums had higher caries rates compared to middle- or upper-middle-class children in New Delhi, India. Children belonging to families with low socioeconomic have very few chances to access dental care. Parents with low socioeconomic status have been found to have low educational levels and poor knowledge regarding oral health and oral hygiene practices. This results in dental caries and its unfavorable sequelae which results in low OHRQoL. Balaji²⁹ stated that dental disease borne expenses by Indians were the lowest when compared to western countries. He has attributed this disparity to a lack of access to dental care and the minimal pay for medication as treatment is expensive and not easily affordable for those in the lower strata of society. The unavailability of dental insurance in India has been also considered a reason for the high prevalence of dental caries in India.³⁰ Children from families with annual incomes greater than 500,000 INR per year were found to have the lowest prevalence in the study population. This can be attributed to better knowledge about oral health care and early introduction of oral hygiene practices compared to lower socioeconomic status.³² Despite better access to dental care, children from the middle- and upper-middle classes are prone to caries due to high sugar consumption.^{31,32}

The early accumulation of dental plaque has been considered to play a critical part in the initiation of caries formation. The presence

of visible dental plaque is considered a sign of poor oral hygiene.³³ In this study, 59.1% of the children had VPI more than 90%. A clear association between dental plaque and ECC has been established. The occurrence of ECC has been found to increase with the increase in dental plaque. Children of parents with higher levels of education often report low dental plaque scores. The results of this study are similar to those published in Thailand^{18,34} and Hong Kong.⁸ Previously published studies in multiple locations determined that visible dental plaque was the most decisive factor related to dental caries when oral hygiene factors were considered. According to Boonyawong et al.,¹⁷ visible dental plaque is the confounder that affects the prevalence of caries and may be correlated to the age at which tooth brushing and assisted tooth brushing was started. Initiatives should be taken to educate parents about good oral hygiene practices as visible dental plaque can be considered an indicator of the progression and dental caries. Thus, visible dental plaque can be considered a warning sign for dental caries where intervention can prevent further progression.

The health practices of a parent can have a direct effect on the oral health of the child. Studies have shown that preschoolers with high levels of *Streptococci mutans* and caries usually have mothers with poorer oral health compared to children without caries.^{8,11,27} Mattila et al.³⁵ reported that poor dental health in 5-year-old children in Finland was as linked to the lifestyle of their parents and frequent sugar intake in their daily meals. Previously published studies have shown that parental preferences for snacks and diet have a strong correlation with their child's caries experience.³⁵⁻³⁷ According to Marciel et al.,³⁷ toddlers and preschoolers whose mothers had the dietary inclination to sweets reported more often with ECC compared to mothers with non-sweet dietary preferences. Thus, maternal preferences for the diet are a prime aspect in molding the child's inclination for sugar and thus can affect her child's risk for ECC.

This study has a few limitations of its own. All patients who were recruited were diagnosed with ECC, hence the factors that could have led to its occurrence could not be completely evaluated. All patients and their families reported to a university dental hospital; hence, the findings might be specific to our location and the patients that visit us for treatment.

Prevention of ECC can begin with the establishment of a dental home or regular 6-month dental check-up visits.³⁸ Frequent and individualized preventive dental health instructions should be given to parents and children at regular intervals through dental visits, phone calls, or messages which in turn will lead to uniform uptake of preventive attitudes in the family.³⁹⁻⁴¹ This will result in good OHRQoL and result in proper growth and development for children.

CONCLUSION

From the results of our study, a relationship between ECC and OHRQoL was found. The presence of pain and visible dental plaque resulted in low OHRQoL. As the severity of ECC increased, a decrease in OHRQoL was seen. Untreated dental caries in children was found to result in pain, thereby affecting both child and their families. Children from with low family income and low parental education levels were found to have low OHRQoL. Parents should be educated about the sequelae of ECC and the effects on general health and measures should be taken to prevent its occurrence.

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