Evaluation and validation of optimized checklist for assessing the risk factors associated with Early Childhood Caries in children between 6 months-6 years of age.

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Abstract

Background: Caries risk assessment is important at children's first dental visit. Information that is obtained through a caries risk assessment can guide caries treatment plan based on the age and risk of each individual to effectively manage their caries process. This, in turn, could raise parental awareness about the causes and consequences of caries. So, the aim of the study was to evaluate & validate an optimized checklist for assessing the risk factors associated with early childhood caries in children between 6 months-6 years of age.

Material and Methods: A cross sectional study, conducted among 105 children and their parents who were come for their first dental visit. The checklist was given to the parents. ECC Checklist comprises of sections like Family History and child's dental history, medical history, Diet history, oral hygiene status, feeding history etc. All the participants were screened and each carious tooth were given a score as per DMFT/deft caries rating scale.

Result: The mean DMFT/deft score of the patients was 2.22 ± 2.75 Parameters like Night time bottle feeding, hard candies and canned juice preferences showed highly significant with their caries score($p < 0.05$).

Parameters like Mother's caries status and intermediate snacking showed potential significant to children's caries status. Chi Square test and Independent T test were applied.

Conclusion: The checklist is efficient for assessment of the caries risk for each individual. Parents should educate according their child's caries risk factors. Any health workers can utilize this checklist at primary caries screening and refer according to that at secondary health centers.

Keywords: Early child hood caries, caries risk assessment, checklist, first dental visit, Healthcare workers

Introduction

Early childhood caries (ECC) is a significant socio-behavioural disorder of the primary dentition that affects the children below 6 years. If ECC is not treated, it can have negative results such as discomfort, impaired chewing, malocclusion, phonetic issues, poor health, and low self-esteem [1,2,3]. ECC is a problem that affects quality of life on a number of social, psychological, medical, emotional, economic levels. Children under the age of three are more susceptible to this illness since they rely heavily on their parents or other adults for nutrition and oral hygiene instructions [4,5]. Because toddlers are difficult to reach and uncooperative, it is challenging to determine the occurrence of caries under this age group [6,7,8].

There are a range of risk indicators for this, including dietary preferences, socio economic position, the mother's employ ment status, dental hygiene practises, and frequent prescription use [9]. Pre-schoolers' hygiene practises are modelled by their families, especially by mothers, whose actions are linked to the frequency of caries in their offspring. There is a correlation between the parent's educational level and the frequency of caries. This can be ascribed to women with limited education not knowing enough about how to care for their children's oral health. According to a study by Kuriakose S. et al. (2015), there is a significant correlation between a mother's employment position and her dental hygiene habits [10].

According to earlier studies, feeding and consuming sugary juices frequently in between meals raises the chance of developing caries. Children in preschool lack the cognitive capacity and manual dexterity necessary to practise excellent oral hygiene. To lower the likelihood of developing caries, parental support and advice are crucial [10]. These underprivileged children in India are primarily situated in rural and urban slum areas, come from low socioeconomic status (SES) homes, have inadequate feeding and nutritional conditions, and have parents who have less education and who are less concerned with their children's health, also they can't access medical facilities. As a result, this group has a relatively high prevalence of ECC [11].

At a child's first dental appointment, a caries risk assessment is essential. According to age and risk, information from a caries risk assessment can direct a caries treatment plan that will help them properly manage their caries. This could assist dentists in developing the most effective treatment plan for each patient by increasing parental awareness regarding causes and effects of caries.

All children are susceptible to dental caries, but some have a higher risk than others, and it is important to identify these children while establishing a checklist. Every dentist evaluates the risk of caries, usually in an informal or implicit manner. Checklists are therefore utilised as cognitive aids to direct treatment needs. The purpose of this study was to check the correlation between early childhood caries status and the optimized

checklist for associated risk factors in children between 6 months-6 years of age.

Methodology

It is a cross-sectional observational study design started after receiving approval from the institutional Ethics Committee (SVIEC/ ON/ Dent/ RP/ 22014). It included the children between 6 months -6 years having the first dental visit at outpatient department of Pediatric and Preventive Dentistry and their parent/s based on the selection criteria. The children whose parents were not able to complete the full checklist were excluded.

The checklist was given to the parents in their child's pre-appointment visit. ECC Checklist comprises of six major sections like Family History and their child's dental history, medical history, Diet history, oral hygiene status, feeding history etc. Parent education regarding the risk factors causing ECC was explained with the help of the Checklist prepared on their own language (English, Hindi, Gujarati) Parent of the participant was asked to fill and bring along the ECC Checklist for participant's first dental appointment.

Content validation was done by subject experts. Concurrent validation was checked by 10 parents of the children. All the questions were retained with Modi fication as per the parents' understanding.

During the first dental appointment, participant was made to seat in upright position with back rest on the dental chair. All the participants were screened by visual and tactile examination using mouth mirror and straight explorer under proper illumination. Each carious tooth was given a score as per DMFT/deft caries rating scale

The collected data was obtained and entered into Microsoft Excel Version 13 and was subjected to Statistical Analysis using IBM SPSS version 21.

Descriptive statistics was applied on the data. To assess the difference in proportion between the variables Chi Square test of proportion was applied. For comparison between DMFT/deft caries and questionnaire variables, Independent T test was applied.

For Questions having more than 3 answers ANOVA was applied. All statistically tests were applied keeping confi dence interval at 95% and (p<0.05) were considered to be statistically significant.

Results

The demographic data in the present study, there were 46 (43.8%) male and 59 (56.2%) females. Out of 105 participants 1 (1.0%) belonged to 06-24 months, 6 (5.7%) belonged to 25-48 months, 98 (93.3%) belonged to 49-72 months. According to the type of family they belonged to it was found that 35 (33.3%) belonged to Nuclear Family and 70 (66.7%) belonged to Joint Family.

Family history

When working status of mother was assessed it was found that 72 (68.6%) were home makers whereas 33 (31.4%) were working mothers which showed signifi cant relation of ECC (p<0.05).

When socio economic status was assessed in participants 100 (95.2%) had earnings more than 10000 whereas 5 (4.8%) had earnings below 10000 Indian currency. (p= 0.081)

When participants were asked regarding consumption of fluoridated water 29 (27.6%) responded that they drink fluoridated water whereas 76 (72.4%) did not consume fluoridated water, this difference in proportion to DMFT/ deft was not statistically significant (p=0.126) When we assessed the mother's as well as siblings' caries status it was found that this difference in proportion to DMFT/deft of participants was near to statistically significant. (p<0.05) When assessment of regular use of dental home was assessed, it was found

out that 8(7.6%) used dental home regularly whereas 97(92.4%) did not use dental home regularly.

Questions	Variables	N(N%)	P value*
working status of mother	Homemaker	72(68.6%)	0.059
	working mothers	33(31.4%)	
Socio-Economic Status (In Indian currency)	earnings more than 10000	100(95.2%)	0.081
	earnings less than 10000	5(4.8%))	
Fluoridated drinking water	Yes	29(27.6%)	0.126
	No	76(72.4%)	
mother's caries status	Yes	32(30.5%)	0.074
	No	73(69.5%)	
sibling's caries status	Yes	20(19.0%))	0.0749
	No	85(81.0%)	
regular use of dental home	Yes	8(7.6%)	0.241
	No	97(92.4%)	

Table 1: showing the comparison between DMFT/deft score and Family history

*Independent T test analysis for comparison between ECC score and risk factors

Child's medical history

Out of 105 participants 3(2.9%) were children with special health care needs and 102(97.1%) were normal children and this difference in proportion to DMFT score was not statistically significant (p<0.05). When mothers were asked regarding the child's medication status it was found that 3(2.9%) were on medication and 102(97.1%) did not take any medication and this difference in proportion to DMFT score was not statistically significant (p<0.05).

Oral hygiene

When mothers were asked regarding the eruption of first tooth in (months) it was found that 63(60%) participants had first tooth erupt before 6 and 42(40%) had tooth eruption after 6.(p=0.066) Regarding the brushing schedule it was found that 1(1.0%) child never brushed, 79(75.2%) had habit of brushing once, 25(23.8%) had a habit of brushing twice.(p=0.904) When mothers were asked regarding usage of fluoridated toothpaste 64(61.0%) used fluoridated toothpaste and 41(39.0%) used non fluoridated toothpaste(p=0.334) .For tongue cleaning it was found that 12(11.4%) cleaned their tongue whereas 93(88.6%) did not clean their tongue. (p=0.157) Regarding flossing practice it was found that only 1(1.0%) had habit of flossing whereas 104(99%) did not use floss. (p=0.780) Although the mothers had a better understanding of oral hygiene, no statistically significant difference was found between the child's DMFT/deft score and oral hygiene practices**.** (Table 2)

Questions	Variables	N(N%)	P value*
eruption of first tooth (in months)	>6	42(40%)	0.066
	<6	63(60%)	
how often the child brush**	Never	1(1.0%)	0.904

	Once	79(75.2%)	
	Twice	25(23.8%)	
Usages of Toothpaste	Fluoridated	64(61.0%)	0.334
	Non-Fluoridated	41(39.0%)	
tongue cleaning	Yes	12(11.4%)	0.157
	No	93(88.6%)	
flossing	Yes	1(1.0%)	0.780
	No	104(99%)	

Table 2: showing the comparison between DMFT/deft score and oral hygiene practices

*Independent T test analysis for comparison between ECC score and risk factors

**ANOVA test analysis for comparison between ECC score and risk factors.

Feeding history

When mothers were asked regarding the breastfeeding duration it was found that 60(57.1%) breastfed their child for less than a year whereas 45(42.9%) continued breastfeeding beyond a year. There may be the significant relationship between ECC and feeding duration. (p=0.07), When assessment of the bottle-feeding practices was done it was found that 43(41.0%) had bottle feeding and 62(59%) did not have bottle feeding practices and we found significant relationship with DMFT/deft score. (p=0.051). When assessment of the night time bottle-feeding practices was asked, it was found that 63.8% had done night time bottle feeding after 1 year. There was strong relationship found with ECC and night time bottle feeding (p=0.0012) (Table 3)

Questions	Variables	N(N%)	P value*
breastfeeding (duration in years)	<1	60(57.1%)	0.07
	>1	45(42.9%)	
bottle feeding	Yes	43(41.0%)	0.051
	No	62(59%)	
night bottle feeding (duration in years)	<1	26(24.8%)	0.0012
	>1	67(63.8%)	

Table 3: showing the comparison between DMFT/deft score and Feeding history

*Independent T test analysis for comparison between ECC score and risk factors

Diet history

When assessment of intermediate snacking was done it was found that 81 (77.1%) participants had a habit of intermittent snaking less than 3 times whereas 24 (22.9%) had a habit of more than 3 times and this score was suggestive statistically significant relationship with ECC (p=0.059). According to preference of hard candies it was found that 44 (41.9%) preferred to have hard candies more than 2 per day also according to preference for canned juice it was found that 32 (30.5%) preferred to have more 2 can juice and this both were in statistically significant proportion to DMFT score (p=0.003). Out of 105 participants 54 (51.4%) had

preference for packed food was not found was not statistically significant with ECC (p=0.336). (Table 4)

Questions	Variables	N(N%)	P value*
Intermediated snacking (per day)	<3	81(77.1%)	0.0599
	>3	24(22.9%)	
Preference for hard candies (per day)	<2	61(58.1%)	0.003
	>2	44(41.9%)	
Preference for canned juices (per day)	<2	73(69.5%)	0.003
	>2	32(30.5%)	
Preference for packed foods	Yes	54(51.4%)	0.336
	No	51(48.6%)	

Table 4: showing the comparison between DMFT/deft score and Diet history

*Independent T test analysis for comparison between ECC score and risk factors

Status of teeth

When assessment of plaque status on anterior teeth was done 18(17.1%) had visible plaque on teeth surface and amongst them DMFT/deft caries score was showing significant relationship. (p=0.0407). When mothers were asked regarding any other oral habits it was found that 20(19.0%) had other oral habits and 85(81.0%) did not have any other oral habit and this was not statistically significant ECC score. (p=0.828) (Table 5)

Questions	Variables	N(N%)	P value*
visible plaque on teeth surface	Yes	18(17.1%)	0.0407
	No	87(82.9%)	
any other oral habits	Yes	20(19.0%)	0.828
	No	85(81.0%)	

Table 5: showing the comparison between DMFT/deft score and Status of teeth

*Independent T test analysis for comparison between ECC score and risk factors

On examination of carious teeth, it was found that out of 105 participants 51(48.6%) had carious teeth and 54 (51.4%) did not have carious teeth. The mean DMFT/ deft score of the patient was 2.22 ± 2.75. (Graph 1)
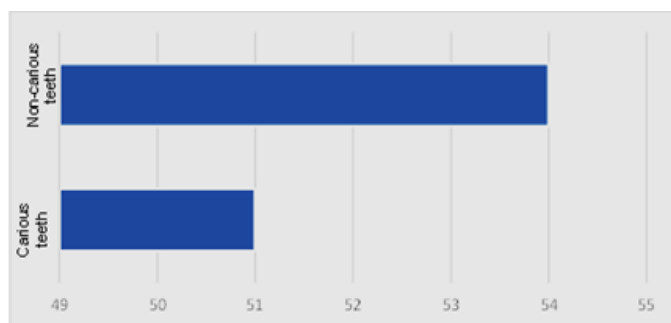
Graph 1: showing presence of carious lesion

Discussion

The aim of this study was to determine the associated risk factors of ECC in 6 months to 6 years of the children of Vadodara city. Early childhood caries (ECC) is defined as caries in the dentition of children younger than six years old. They have the ability to reduce the chance of getting caries if the risk factor is controlled, such as feeding patterns, fluoride exposure, time, and frequency of intermediate snacking.

For determining the significance of the relationship with ECC, family variables have also been taken into consideration. In our study, we assessed Mothers' caries

status and siblings' caries status were potentially significant (p=0.07). One study showed higher number of siblings to be related to higher occurrence of ECC (p = 0.046) [12].

Factors such as low SES has been investigated and it may have the relationship with occurrence of ECC(p=0.081) like few studies [13,14,15]. The reason for the inconsistent results with the SES factor could be the different scales used in different studies, based either on only household income [17] per capita monthly income [13], or based on the parent's occupation status, with social class level based on the higher occupation status of the father or mother [16].

In our study visible plaque was statistically significant to ECC, tooth brushing frequency, usages of fluoridated tooth paste, visit to dental home, any oral habits were showed no significance. One of the included research projects listed parental pampering as one of the primary risk factors for ECC. This occurred when caregivers missed to brush their child's teeth twice a day [18]. Amongst all the variables examined, visible plaque [19] and not brushing once a day were most significant oral hygiene-related indicators for ECC [20, 21]. The other less significant factors include the age at which brushing began, not brushing teeth before bed, using non fluorinated tooth paste [22, 23, 24]. Exposure of fluoride was investigated by Subramanian et al. in 2012, which showed significant association between use of non-fluoridated dentifrice and ECC development [25, 26]. According to that study, children who were using fluoridated dentifrice had a significantly lower percentage (18.3%) of caries. Dental history (visit to dentist) was examined as a possible risk indicator for occurrence of caries Out of the two studies, one reported it to be significantly associated with ECC [27] while the other reported no significant association [28].

In our study approximately 42% continued breastfeeding beyond a year and when corelate with their caries score, it was found near to statistical value(p=0.07). So, this variable can be described as potential risk factor for ECC. Similarly, the systematic review by Cui et al concluded that there was no significant difference pertaining to the acquisition of ECC when the child was exclusively breastfed or fed with the bottle [29]. However, Prakash et al (2012) showed that prolonged breastfeeding was one of the risk factors associated with ECC. From 554 breastfeeding mothers, 164 were known to have prolonged on-demand breastfeeding with a prevalence of caries of 29.6% and 202 people who breastfed until the age of 1 year of age with a caries prevalence of 26.7%. This demonstrates that children who breastfeed for longer than a year have a much higher chance of developing caries [30]. Prolonged breastfeeding will reduce the pH of plaque in the mouth, thereby increasing the risk of ECC [30]. An umbrella review (2022) concluded that breastfeeding after the age of one year with nocturnal feeding, had significant relation with ECC [31].

In our study night time bottle feeding was positively associated with ECC (p=0.01), similarly the other studies [32, 33, 34, 35].

Due to saliva, dietary nutrients administered throughout the daytime are typically eliminated through oral clearance. This prevents compounds from building up on enamel over time so that the enamel demineralization will not occur. Also, in the sleep time this oral clearance does not happen leading to prolonged demineralization of enamel without any remineralization happening in between [36].

Several dietary components were linked to ECC. The majority of these variables had something to do with how often, how much, or when sugar was consumed

[35]. The frequency of sugar-rich eating items more than once a day was the dietary potential risk and that was most frequently studied among all the other variables. The result of this study showed that approximately 69% patricians prefer sugary food items and packed food more than 2 per day. This suggests that despite being aware of nutritious food options, parents frequently purchase unhealthy meals because they are readily available and let their children eat them, similarly found in study by Anjum MS et al [37]. A higher sucrose intake was either associated with a higher caries prevalence or a statistically significant difference in the frequency of sugar intake and caries prevalence [38,39]. In our study, preference for hard candies and canned juice more than 2 times per day showed positive correlation with ECC (p=0.003). Children were introduced to sugars mostly at 6 months and were all ingesting added sugars at 12 months [38].

Certain drinks include both cariogenic polysaccharides and erosive acids, and also the low PH of some of these drinks and high titratable acidity are precursors of caries [39].Caries risk increased with the use of both bottle and breast feeding, habit of milk at night, eating snacks between meals, decrease in parental supervision during oral hygiene practices, increased access to junk food and refined sugar daily with more than two times in a week was found statistically highly significant in the study (p < 0.01)[40].

Through ECC checklist, we found that Parents are highly satisfied with caries education and look forward for caries preventive as well as corrective strategies. We have developed in people's own language. Limited sample size, unequal division of the age group sample, parent's recall bias and unicentric to the hospital OPD patients can be limitation of our study.

Recommendations

This study can be helpful for making a scoring criterion for caries risk assessment. This in turn, it could raise the parental awareness. Digitalization of these questionnaire can be possible, can make it available for any health worker for primary screening of caries.

Conclusion

The present study identified that bottle feeding practices, intermediated snacking more than three times a day, children who had hard candies and canned sugar juice more than twice daily had strong relationship in the occurrence of ECC in children when compared with other risk factors.

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