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ORIGINAL STUDY

Mothers' knowledge regarding the relationship between dental pain and early childhood caries in association with bottle-feeding Practices

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Abstract

Background: All the previous studies were concerned with determining the prevalence of dental pain and dental caries among children. Hence, this study aimed to accumulate data concerning the mothers' knowledge regarding the relationship between dental pain and early childhood caries in association with bottle feeding practices.

Methodology: This was a validated, self-administered questionnaire-based cross-sectional study conducted among the general population of Karachi consisting of parents specifically mothers or caregivers of children aged 1-5 years. The ECC symptoms in children were characterized and mothers' knowledge was assessed for the ECC.

Results: Most caregivers were postgraduate (36%), middle-class (55%), and mothers (76%), and lived in a joint family system (61%). It was found that 45% of participants had extremely frequent bottle-feeding practices and the majority of the parents/ caregivers were highly knowledgeable (72%) regarding the symptoms of ECC concerning the frequency of bottle feeding (P-value = 0.001). Further, multivariate regression analysis significantly indicated that participants having education till college level and above (P-value = 0.001), participants who were students (P-value = 0.014) or were engaged in part-time jobs (P-value = 0.007), and mothers (P-value = 0.008) or grandparents (P-value = 0.007) as the main caregiver were more knowledgeable about the ECC symptoms.

Conclusion: Although the current study revealed high knowledge of ECC among the participants. Despite this, the parents of children with ECC face a severe knowledge gap, which is interfering with the selection of proper oral hygiene aids for their children.

Keywords

Mothers, Knowledge, Early Childhood Caries, Dental Pain, Bottle Feeding



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Introduction

Early childhood caries (ECC) is a non-communicable disease that is widespread all over the world. It is the new terminology that is quietly used to describe dental caries for toddlers and infants. Other terminologies have also been evolved in the previous decades to explain this condition like baby bottle caries, nursing caries and nursing bottle caries, baby bottle tooth decay, milk bottle syndrome, and prolonged nursing habit caries^{1,2}.

ECC is characterized as the presence of at least one rotted, missing, or filled tooth surface in any essential tooth in children aged 5-7 years old or younger. It starts with white-spot sores in the upper essential incisors along the edge of the gingiva. On the off chance that the illness proceeds, caries can advance, prompting total pulverization of the crown. It has a few special qualities in clinical appearance which is the development of dental caries and plaque which progress and affect other teeth when once started in the oral cavity³.

The etiology of the disease of toothache and caries is due to the consumption of sugar both mono and disaccharides, which, when stayed in the mouth for more time on teeth, lowers the PH of the internal environment due to which acidogenic microorganisms become active and demineralized the enamel of the teeth which then damage and destroy the structure of the teeth as well⁴. The increase of caries and plaque among children is also because people are abolishing the recommendation and guidelines of WHO regarding the consumption of sugary snacks and other sugary products and consuming much higher amounts of sweet products which is also against the laws⁵.

ECC is a multifactorial illness that outcomes from the association of elements that incorporate cariogenic microorganisms, openness to fermentable sugars through unseemly taking care of practices, and the scope of social factors [2]. Various number of people lose their teeth because of dental caries⁶. The children are not

taking care of their oral health personally and don't care about the dental checkups also parents are ignoring their obligations in taking care of their children due to which neither they nor their children get aware of these health precautions⁷. Tooth decay and caries if unchecked and untreated, can lead to severe complications both chronic and acute⁸.

Further, children below 6 years are mostly concerned as they cannot take care of their own. They are dependent on their parents and need to be looked after, in particular mothers are role models for developing good routines dietary habits, and behavior¹⁰. Children who are used to bottle feeding at night and along with sleeping in their mouth, take milk with sugar have more prevalence and risk of caries than those who don't have habits like these. The lump of observation of past studies reported that as the saccharides (sugar) intake rises from 15 to 20 kilograms per year for an individual, it predisposes the caries to develop very rapidly.

Dental caries, consumption of sugar (both disaccharides & monosaccharides), and weight gain have a quite strong relation with oral health, which negatively affect not only the standard of living and educational status of children but also their family members along with the financial and health hygienic inference¹¹. The severity of dental pain was also shown to cause an unbalancing in children's growth development and weight loss. Studies have concluded that children containing more severe caries would have a lower weight that happened due to the suppression of certain metabolic pathways, but after treatment, they would rapidly gain weight which is due to the consumption of highly sugary products.

The prevalence of dental pain and caries from the review of literature conducted globally suggests that there are the highest rates of acquiring dental caries in between 40-90% of school-going children in different parts of the world such as South East Asia, South America, and the farthest of Europe. The overall dental caries level among

the pediatrics has fallen in recent years in the high and middle-income population, which has been made possible by adopting good habits of brushing teeth with toothpaste containing fluoride¹². But the matter of fact is that caries are increasing in the lower socioeconomic population, low-developed countries, and disadvantaged groups, as the outcome of nutritional shift because increases in wages and urbanization lead to more expenditure on bottle feeding and other industrial processed products¹³. Concerning Pakistan, both low and high-socioeconomic families are affected by ECC. One study conducted at Fatima Jinnah Dental College and Hospital, Karachi reported a 50.1% prevalence of ECC¹⁴. Other studies also reported the ECC prevalence of 51% and 40.1% among preschool children^{15, 16}.

All the previous studies were concerned with determining the prevalence of dental pain and dental caries among children. Hence, this study aimed to accumulate data concerning the mothers' knowledge regarding the relationship between dental pain and early childhood caries in association with bottle-feeding practices among the general population of Karachi. In addition, this study also aimed to compare the relationship of dental pain and early childhood caries with the demographic variables of the study participants.

Methodology

This was a validated, self-administered questionnaire-based cross-sectional study conducted among the general population of Karachi including the Central District, Korangi District, Malir District, and East District.

The total population included in this study was 1200 consisting of parents specifically mothers or caregivers of children aged 1-5 years, recruited through a purposive sampling technique from September 2022 to March 2023.

A pair of children aged 1-5 years with their caregiver was included in this study. However, individuals taking care of children aged above or below the mentioned age group were excluded. This study was reviewed and approved by the

Institutional Review Board of Malir University of Science and Technology.

The relationship between dental pain and ECC was assessed using a questionnaire. Items were rated and scored according to the seven-point type Likert scale for assessing the frequency of bottle feeding. Data of the study were ordinal according to a levels scale for the frequency of bottle feeding as 0 to 3 for never, only 1 time per day, only 1 time per night, 1-2 times per day and night, and 2-3 times per day and night, respectively and were categorized as not frequent, less frequent and extremely frequent. Further, ECC symptoms in children were characterized as a child complaining of tooth pain, a black/ brown spot on the front/ back of the tooth, an extra white spot on teeth, or a child having any broken teeth. Thereby, mothers' or caregivers' knowledge was assessed for the ECC. A cut-off value of 50% and 75% was set. Hence, individuals scoring less than 50% were considered less knowledgeable, those scoring between 50-75% were considered as moderately knowledgeable and those who scored above 75% were highly knowledgeable regarding the symptoms of ECC.

The Statistical Package for Social Sciences software (SPSS, version 16) was used for data processing and statistical analysis. Categorical variables were analyzed using frequencies and percentages whereas, associations and correlations were assessed using Chi-square tests. Statistical significance was set at $P < 0.05$.

Result

The total population included in this study was 1200 consisting of both male (49%) and female (51%) children aged between 1-5 years of age. Most of the caregivers were educated to the level of postgraduate (36%). The majority of the population belongs to mainly middle class (55%). Further, many of them live in a joint family system (61) and the main caregiver was a mother in 76% of the cases (Table 1).

The bottle-feeding frequency of the participants was also assessed. It was found that 45% of participants had bottle feeding extremely frequently (Figure 1).

It was found that the majority of the parents/caregivers were highly knowledgeable (72%) regarding the symptoms of ECC concerning bottle feeding and the association was found to be quite significant (P-value = 0.001) (Figure 2).

When the early childhood carries were assessed in association with the mothers' education, significant associations were found with the knowledge regarding the presence of black and brown spots on the front or back of the tooth of their child (P-value = 0.001). Further, multivariate regression analysis indicates that participants with education till college level and above (P-value = 0.001) were more knowledgeable about the ECC symptoms (Table 2).

When the early childhood carries were assessed in association with the socioeconomic status of the study participants, no significant associations were found with any of the early childhood carries symptoms. Additionally, multivariate regression analysis significantly indicates that the

socioeconomic status of the participants does not have any impact on their knowledge about the ECC symptoms (P-value = 0.007) (Table 3).

When the early childhood carries were assessed in association with the current occupation of the mother or the caregiver of the child, significant associations were found with the knowledge regarding the presence of black and brown spots on the front or back of the tooth (P-value = 0.001). Moreover, multivariate regression analysis showed a significant association indicating that participants who were students (P-value = 0.014) or were engaged in part-time jobs (P-value = 0.007) were more knowledgeable about the ECC symptoms (Table 4).

When the early childhood carries were assessed in association with the main caregiver of the child, significant associations were found with the presence of an extra white spot on the front of the tooth (P-value = 0.000). Furthermore, multivariate regression analysis showed a significant association indicating that mothers (P-value = 0.008) or grandparents (P-value = 0.007) as the main caregiver were more knowledgeable about the ECC symptoms (Table 5).

Table 1: Demographic characteristics of the study population (n=1200)

Demographic Characteristics		Frequency (%)
Age of child	Toddler	535 (45)
	Pre-school	665 (55)
Gender of child	Male	584 (49)
	Female	616 (51)
education of caregiver	school	134(11)
	College	231(19)
	Undergraduate	400(33)
	postgraduate	435(36)
socioeconomic status	lower class	347(29)
	middle class	655(55)
	upper class	198(17)
Family structure	single	470(39)
	joint	730(61)
Weight of child	3 to 13 kg	540 (45)
	14 to 24 kg	623 (52)
	25 to 35 kg	57 (3)

Bottle-feeding	Yes	792 (66)
	No	408 (34)
current occupation	full time working	365(30)
	student	71(6)
	part-time working and student	90(8)
	self-employed	270(23)
	housewife	404(34)
Main caregiver	mother	912(76)
	father	196(16)
	grandparent	68(6)
	any other	24(2)

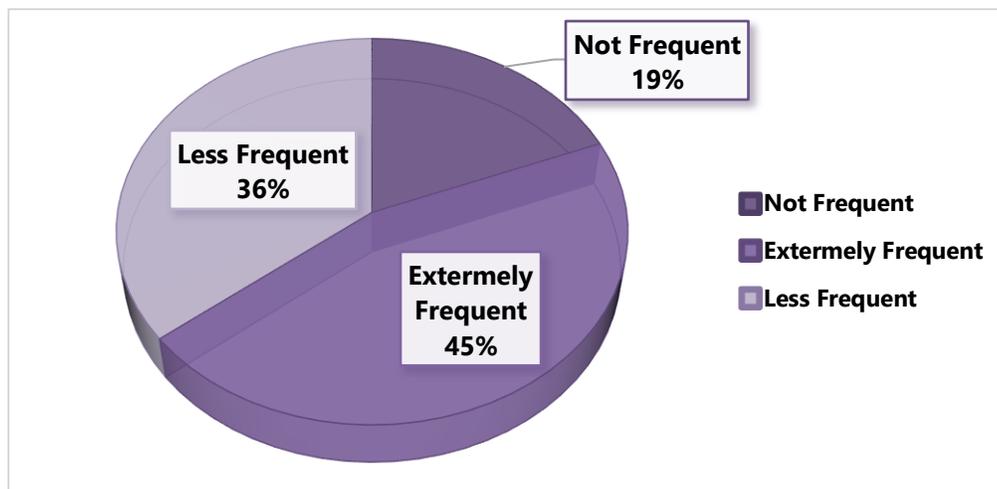


Figure 1: The frequency of bottle feeding among the study population (n=792)

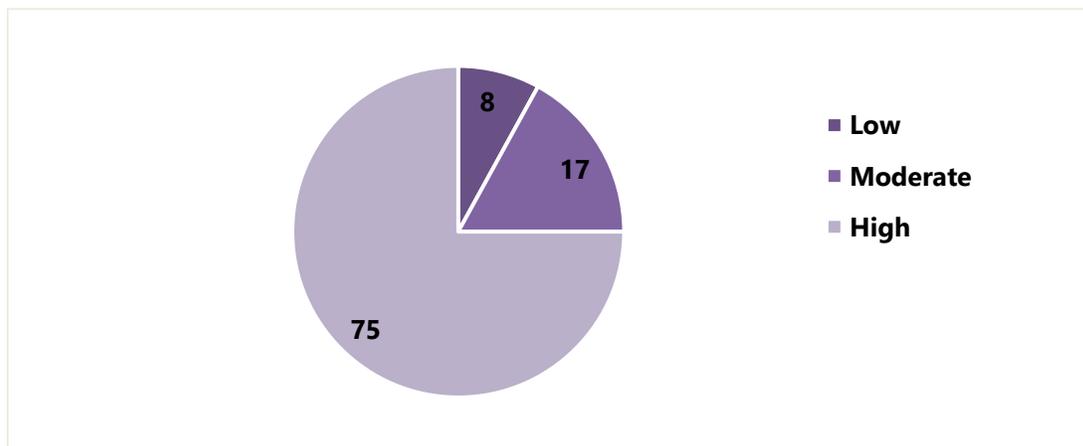


Figure 2: Knowledge level regarding the ECC symptoms among the participants

Table 2: Early childhood caries in association with the caregiver or mother's education.

Early Childhood Caries		Mother education				p-value
		School	College	Undergraduate	Postgraduate	
Does the child complain of tooth pain?	No	90	139	247	277	0.550
	Yes	44	92	153	158	
Black/ brown spot on front/ back tooth	No	105	144	285	327	0.001
	Yes	29	87	115	108	
Extra white spot on teeth	No	110	194	349	361	0.200
	Yes	24	37	51	74	
Any broken teeth	No	93	158	265	301	0.800
	Yes	41	73	135	134	

Table 3: Early childhood caries in association with the socioeconomic status of the participants

Early Childhood Caries		Socio economic status			P-value
		Lower Class	Middle class	Upper class	
Does the child complain of tooth pain?	No	208	427	118	0.150
	Yes	139	228	80	
Black/ brown spot on front/ back tooth	No	246	472	143	0.910
	Yes	101	183	55	
Extra white spot on teeth	No	285	559	170	0.340
	Yes	62	96	28	
Any broken teeth	No	226	451	140	0.330
	Yes	121	204	58	

Table 4: Early childhood caries in association with the current occupation of the mother or caregiver

Early Childhood Caries		Current occupation					P-value
		Full-time working	Student	Part-time	self-employed	Housewife	
Does the child complain of tooth pain?	No	228	48	56	161	260	0.550
	Yes	137	23	34	109	144	
Black/ brown spot on front/ back tooth	No	259	60	76	183	283	0.001
	Yes	106	11	14	87	121	
Extra white spot on teeth	No	316	60	75	237	326	0.200
	Yes	49	11	15	33	78	
Any broken teeth	No	251	55	57	183	271	0.800
	Yes	114	16	33	87	133	

Table 5: Early childhood caries in association with the main caregiver of the child

Early Childhood Caries		Main caregiver				p-value
		Mother	Father	Grandparents	Any other	

Does the child complain of tooth pain?	No	576	129	35	13	0.150
	Yes	336	67	33	11	
Black/ brown spot on front/ back tooth	No	658	134	53	16	0.420
	Yes	254	62	15	8	
Extra white spot on teeth	No	790	146	62	16	0.000
	Yes	122	50	6	8	
Any broken teeth	No	629	131	39	18	0.200
	Yes	283	65	29	6	

Discussion

Dental pain is a condition that is very painful, life-disturbing, chronic, and infectious and could be a serious public health problem for preschool children and toddlers as well if not catered properly. Although it is a preventable and curable condition^{2, 17}. Some contributing factors to dental caries & pain like the frequency of consumption of sugar such as sugary items and confectionary lead to the accumulation of caries^{8, 18}.

It was observed in the current survey that the majority of the parents/ caregivers were highly knowledgeable (72%) regarding the symptoms of ECC concerning bottle feeding and the association was found to be quite significant (P-value = 0.001). In contrast, a study conducted in Mumbai, India (mixed-method study)¹⁹ and among urban Mexican American & and immigrant Latin parents reported low-depth ECC knowledge^{20, 21}. As the current study was conducted regarding the relationship of ECC with the bottle feeding, the average prevalence of ECC was 22% (including black & and white spots on teeth), whereas the study conducted in different areas of Pakistan showed a prevalence of 29%-85%^{14, 22, 23} which is quite high in comparison to the current study.

The feeding practices of the children are significant in ECC^{14, 24}. In the current survey analysis, it was found that the feeding practices including a nursing bottle or normal bottle feeding were 66%. Generally, milk utilization has been shown as a protective component against ECC because the calcium present aids in tooth mineralization^{25, 26}, and the children who have milk more tend to drink lower quantities of sugar-

sweetened beverages which predispose caries to develop^{25, 27}. However, some high-frequency consumption of milk has been reported to be cariogenic particularly bottle feeding in bed, and bottle feeding over two years of age²⁵.

The result indicated significant associations between the occupation of the mother (caregiver) with the knowledge regarding the presence of black and brown spots on the front or back of the tooth (P-value = 0.001). In contrast, no significant correlation with the caregiver/ mother's occupation in a study conducted in Sudan²⁰.

Further, significant associations were found with the knowledge regarding the presence of black and brown spots on the front or back of the tooth of their child (P-value = 0.001) and the mother's education. But as far as other researches are concerned, no mutual consensus regarding maternal education on caries development was found, further some reported no correlation between them²⁸. On the other hand, a study conducted in Brazil suggested that a good maternal education level lowers the development of caries in children²⁹.

When the ECC association was assessed with the socioeconomic status of the family, no significant relation with ECC symptoms was found. Similarly, a study conducted in Brazil reported no significant association between socioeconomic status with the ECC²⁹. In this study, when the ECC was assessed in association with the main caregiver of the child, significant associations were found with the knowledge regarding the presence of extra white spots on the front of the tooth (P-value = 0.000), specifically among

mothers and grandparents. The oral health behavior of the caregiver of the children plays a crucial role in figuring out the oral health of their children³⁰. In previous studies, parental oral health behaviors and feeding practices have been claimed to be the key factors associated with ECC³⁰. Children copy their parents and their oral health behavior, which plays an essential part in the prevention of deciduous caries³⁰.

This study had some limitations. Firstly the cross-sectional study design could not predict the causal relationship between dental pain and ECC with the bottle feeding practices. Moreover, participants' responses might have been subjected to recall and information biases. Hence, future studies and research should be more productive and fruitful in terms of using the tools for a better understanding of the consumption of sugar and dental caries among individuals residing in Karachi, Pakistan.

Conclusion

Although the current study revealed high knowledge of ECC among the participants. Despite this, the parents of children with ECC face a severe knowledge gap, which is interfering with the selection of proper oral hygiene aids for their children. They also face barriers in implementing oral hygiene routines for their children, despite awareness that tooth brushing is important. Based on these results, parents and caregivers understand the unfavorable effects of ECC on children's quality of life; however, their attitudes toward the disease seemed to be inaccurate, influenced by their daily routines, doubts, and beliefs. Prohibition of bottle feeding, specifically in bed and daily supervised tooth brushing, with or without oral health education is effective in preventing ECC among preschool children with health neglect in very low - resource settings. Less than twice daily tooth-brushing and difficulties in performing the procedure during the first preschool years were significant determinants of caries prevalence at the age of 5 years. Health professionals should, therefore, give special attention and assist parents in improving

and optimizing their tooth-brushing behavior during the preschool years.

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