Maternal Knowledge of Oral Health of Children Aged 1-4 Years

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Introduction. *Knowledge of oral health (KOH) among mothers has an important influence on their children's oral habits and routines. Lack of maternal KOH had been related to the development of early childhood caries among preschool children.* ***Aim.*** *To assess KOH among mothers of 1-4 year-olds.* ***Study design.*** *Participating mothers completed a 3-part questionnaire on general demographic information, KOH of their children, and ranking of six food items according to their cariogenic potential.* ***Results.*** *Most of the 285 participating mothers had an academic education. Only 47% of the mothers correctly answered seven questions on KOH. The dentist was the main source for KOH. Most of the mothers (94.39%) were aware of the need to brush their children's teeth twice daily. Most of them (72.29%) did not know the correct fluoride concentration in their child's toothpaste. They ranked salty snacks as the least cariogenic food item. Most of the mothers were not aware that snacks and sweetened drinks should be consumed during meals, and two-thirds reported tasting food from their child's spoon.* ***Conclusion.*** *Overall, mothers of toddlers lacked basic knowledge of oral health issues and practices to follow for the prevention of their children's caries.*

Key words: *Oral health education, Maternal, ECC, Pediatric dentistry, Prevention.*

INTRODUCTION

Early childhood caries (ECC), one of the most common of the chronic diseases of childhood, is a public health problem that continues to affect babies and preschool children worldwide. ECC has a debilitating effect on development, speech, general health, and self- esteem, thus affecting the quality of life of children.[1,2] There are multilevel influences on children's oral health at the individual, family and community levels. These family level influences are mediated mainly through parents and caregivers with whom preschool children spend most of their time.[3] During this period of primary socialization, the establishment of routine dietary and health behaviors is directly and indirectly influenced by the knowledge on oral health (KOH), and on the attitudes, beliefs and practices of their parents and caregivers.[4]

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Parental knowledge of the risk factors for ECC was reported as being incomplete,[5] and the lack of KOH was significantly related to the occurrence of caries in 3-6 year-old children.[6] Moreover, social, demographic, and behavioral factors, such as family income and maternal education level, were shown to directly affect ECC prevalence and severity.[7,8] Knowledge and awareness are necessary prerequisites for changes in behavior, including practices related to health and disease prevention.[5] The behaviors established in childhood have extensive implications, not only on children's current oral health, but also on their oral health as they grow into adults.[9] Therefore, efforts to educate parents can be effective in changing behavior and, consequently, may contribute to improving the oral health of their children.[10]

Earlier studies have found gaps in OHK among mothers and caregivers in general,[5,9,11] but there is not enough information regarding KOH of high educated mothers of toddlers. The following study explores maternal KOH of specific oral health issues like the cariogenic potential of different food items, oral health habits at home and maternal knowledge regarding recommendations that should be given to them by health providers in the first years of their child's life.

The aim of this paper was to assess the level of knowledge about oral health among mothers of toddlers aged 1-4 years.

METHODS

The study participants were 285 mothers of children aged 1-4 years who responded to a maternal KOH questionnaire. The questionnaires were distributed to the mothers by preschool teachers of private kindergartens, or were sent to them to be filled out online. A written explanation about the research was sent with the questionnaire.

The questionnaire

The questionnaire was comprised of 3 parts. Part 1 consisted of items that pertained to general demographics, such as the mother's age, parents' education (<12 years or >12 years), frequency of dental visits by the mother (on a regular basis or not), the child's age and gender, the number of children in the family, and the child's birth order. Also queried was the mother's main source of information about pediatric dentistry (dentist, media or friends) (Table 1). Part 2 was an 11-item questionnaire pertaining to pediatric KOH (Fig. 1). Part 3 ranked six selected food items according to their cariogenicity (Table 2). The study was approved by the ethical committee of Tel Aviv University. All respondents gave their informed consent to participate in the study.

Table 1.Demographics, dental visit habits and source of information.

Mother's age (years ± SD)	36.7 ±4.3		
Parent's education	Fathers	<12 years	38 (13.8%)
		>12 years	236 (86.2%)
	Mothers	<12 years	20 (7%)
		>12 years	265 (93%)
Visits dentist on a regular basis (mother)	Yes		84 (29.5%)
	No		201 (70.5%)
Main source of information on pediatric dentistry (mother)	Dentist		150 (52.6%)
	Media		104 (36.5%)
	Friends		31 (10.9%)
Child's age (years ± SD)	2.8 ±0.9		
Child's gender	Boys		146 (51.2%)
	Girls		139 (48.8%)
Child's birth order	1st		122 (42.8%)
	2nd		74 (26%)
	3rd or more		89 (31.2%)
Number of children in the family	1		72 (25.3%)
	2		107 (37.6%)
	3 or more		106 (37.1%)

Table 2. Rank of six selected food items according to cariogenicity.

Type	Rank (mean)	Standard deviation
Toffee*	3.9	0.45
Sweetened drinks*	3.57	0.68
Breakfast cereals*	3.25	0.8
Ice cream	2.86	0.91
Dark chocolate	2.8	0.88
Salty snacks	2.71	0.89

*Significant difference (Bonferroni multiple comparison test)

Figure 1.Questionnaire on knowledge of pediatric oral health

1. **When is it necessary to brush your child's teeth?**
   a) Twice a day and after eating sweets.
   b) After each meal.
   c) No need to brush at that age.
2. **When is it necessary to replace your child's toothbrush?**
   a) No need to replace as long as the bristles are intact.
   b) Every three months.
   c) As the child grows and the size of the brush has to be changed.
   d) Do not know.
3. **What is the right amount of toothpaste that is suitable for your child?**
   a) Pea-sized.
   b) Covers all the brush.
   c) No paste needed.
   d) As long as the child can spit the paste amount is irrelevant.
   e) Do not know.
4. **Who should brush your child's teeth?**
   a) The child.
   b) The parent demonstrates and the child brushes by himself.
   c) The parent.
   d) There is no need to brush at this age.
   e) Do not know.
5. **What is the right concentration of fluoride that should be in your child's toothpaste?**
   a) Toothpaste without fluoride.
   b) Toothpaste with less than 1000 PPM fluoride.
   c) Toothpaste with more than 1000 PPM fluoride.
   d) Do not know.
6. **Do you think that drinking infant formulas during the night contributes to the development of dental caries?**
   a) Yes.
   b) No.
   c) Do not know.
7. **Do you think that drinking human breast milk during the night contributes to the development of dental caries?**
   a) Yes.
   b) No.
   c) Do not know.
8. **What is the best time for your child to consume snacks or sweetened drinks?**
   a) During meals.
   b) In-between meals.
   c) It does not matter as long as the amount is limited.
   d) Do not know.
9. **Do you tend to taste your child's food from his spoon?**
   a) Yes, it is necessary in order to check the warmth of the food
   b) Yes, in order to check if the food is tasty
   c) No, never
10. **What is the maximal age to end the use of a pacifier?**
    a) By the age of 4 years.
    b) Six years, with the eruption of the permanent front teeth.
    c) Do not know.
11. **What is the right age for a first visit to a pediatric dentist?**
    a) In proximity to the eruption of the first tooth and no later than the age of one year.
    b) At the age of 3 years.
    c) When the primary teeth begin to fall out.
    d) When the child complains.
    e) Do not know.

Statistical analysis

The data were analyzed using SPSS (Statistical package for the social sciences) version 23.0. The bivariate analysis was performed by the Chi-square and Fisher's exact tests.

RESULTS

The average age of the 285 mothers who responded to the questionnaires was 36.7 ±4.3 years. The average grade of the 11-item questionnaire was 57.6 ± 14.9. Figure 2 illustrates the percentage of mothers who answered the questions correctly. Importantly, they showed a good level of knowledge about oral hygiene, with 94.39% of them correctly responding that the child's teeth should be brushed twice a day. Most of the mothers (72.63%) knew that it is necessary to replace the toothbrush every 3 months, and a similar percentage of them (74.04%) replied that the correct amount of toothpaste is "pea-sized". Almost two-thirds of the responders knew that the parent should be the one who brushes the child's teeth, while the rest believed that the parent should demonstrate and that the child should brush his teeth by himself. As for the proper concentration of fluoride in the toddler's toothpaste, only 29.15% of the mothers correctly responded "under 1000 PPM", while 58.25% replied that they "Do not know".

Most of the mothers (85.11%) knew about the cariogenic potential of consuming baby formulas at night, while only one-half (51.18%) thought that human breast milk can also cause caries when the child nurses at night. Two-thirds of the mothers (67.37%) claimed that the most important thing about eating sweets is that the amount should be restricted, and the same percentage responded that they taste their child's food from his spoon.

Almost all of the mothers (85.96%) correctly responded that the age of 4 years is the maximal time to end the habit of using a pacifier, but only one-quarter of them knew that the correct age for their child's first dental visit should be in proximity to the eruption of the first tooth and no later than the age of one year (57.54% believed that it should be when their child reaches 3 years of age).

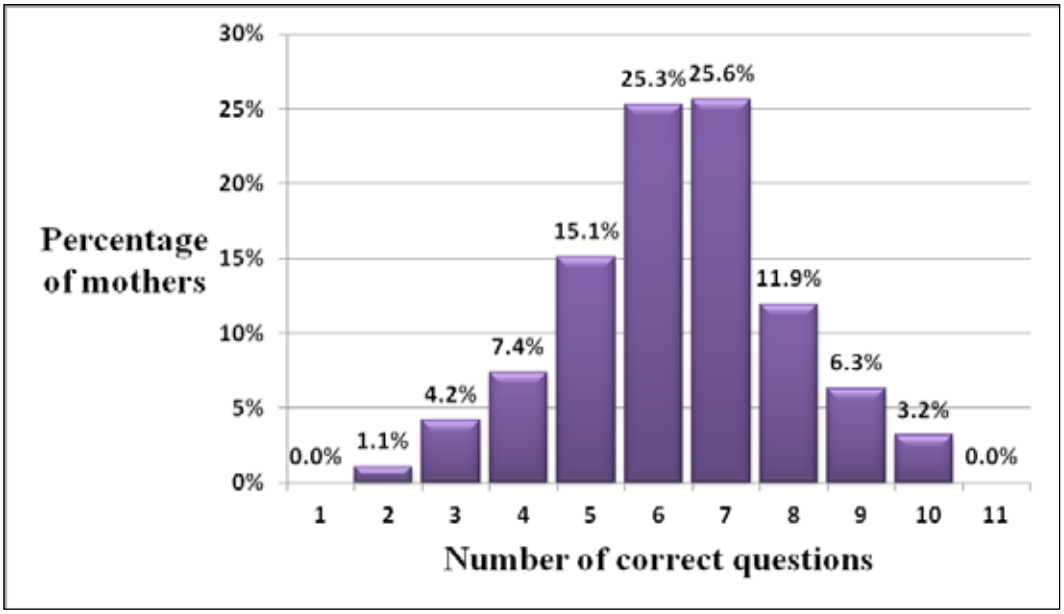
Mothers were asked to rank six different food items according to their cariogenic potential on a scale of 1-4 (1 = the least cariogenic, 4 = the most cariogenic) (Table 2), and the highest ranked food among them was toffee (3.9 ± 0.45).The three bottom rankings were ice cream (2.86 ± 0.91), dark chocolate (2.8 ± 0.88) and salty snacks (2.71±0.89), there was no significant statistical difference between the three food items (Bonferroni multiple comparison test).

Mothers of a single child received the lowest score on the level of knowledge on oral health related issues (53.5), and it was significantly different from the score of mothers of 3 or more children (59.3) (P = 0.039, one-way ANOVA). Mothers who responded that their friends were the main source of information about pediatric dentistry received the lowest score (50.14), and it was significantly different from the score of mothers whose information came mainly from their dentists (58.08) (P = 0.018, one-way ANOVA). The latter mothers correctly responded to the question about "what is the best time of day for your child to consume snacks or sweetened drinks" (22.8%) and it was significantly different from mothers whose sources were the media or friends (16.1% and 10.6%, respectively) (P = 0.041, Pearson chi-square). There was no difference in the average score of mothers with respect to their age (>37 years or <37 years), or to the child's age (>2 years or <2 years), or whether the mother went to the dentist on aregular basis.

DISCUSSION

Parental perceptions about their children's oral health can affect the preventive dental care that children receive at home and their use of professional dental services.[9]Tenovuo*et al*. noted that children who were infected with cariogenic bacteria after the age of 3 years had a significantly lower incidence of caries than those who were infected earlier.[12]Yet, there are not many studies that investigate KOH of high educated mothers of toddlers in specific issues like cariogenic potential of food items, recommendations of oral health institutes concerning this age group and oral habits at home. This survey therefore aimed to contribute more information on the level of KOH of mothers of toddlers.

Figure 2.Correct responses to an 11-item questionnaire on maternal knowledge of oral health among toddlers



Most of the mothers (83%) who participated in the current study had an academic education, and most of them (70.5%) stated that they visit their own dentist on a regular basis. Lower socioeconomic status and educational level are commonly associated with poorer oral health and less favorable attitudes towards dental care.[13,14] In spite of their having more than 12 years of education, the mothers' knowledge with regard to their children's oral health was incomplete, with only 47% of them having correctly answered ≥7 questions. The level of knowledge on oral health related significantly to the number of children in the family. Mothers of a single child exhibited less knowledge than those of ≥3 children, possibly indicating a learning curve over time. Other studies have also shown only superficial knowledge of mothers and other caregivers regarding their children's oral health which was directly proportional to mother's lower education level and fewer children in the family.[11,15]

Unlike a good level of knowledge about the role of tooth brushing in maintaining good oral health, (over 90% of the mothers knew that brushing is recommended twice a day and almost 2/3 of them knew that the parent should brush the child's teeth), most of the mothers did not know what is the correct amount of fluoride in their child's toothpaste. According to the Israeli Ministry of Health, toothpastes that contain 500-900 ppm fluoride should be used by children aged 2-6 years, toothpastes that contain 1000-1500 ppm should be used above the age of 6 years, and no fluoridated toothpaste should be added to the brushing of children under the age of two years unless otherwise recommended by a dentist.[16] Exposure to optimal levels of fluoride plays a major role in caries prevention.[5] It is also important for the prevention of excessive fluoride digestion that may result in fluorosis.[17] The reduced level of knowledge of the mothers who participated in the current study may portend that their children are being exposed to non-optimal levels of fluoride.

It is well recognized that diet plays a major role in caries development. Food items that contain carbohydrates, such as sucrose, glucose or fructose, are rapidly fermented by acidogenic microorganisms and cause a decrease in pH and demineralization of the teeth. The longer this acidity continues, the greater the risk for demineralization.[18] According to the recommendations of the American Academy of Pediatric Dentistry (AAPD), "Infants should not be put to sleep with a bottle filled with milk or liquids containing sugars. ". Ad libitum breast-feeding should be avoided after the first primary tooth begins to erupt and other carbohydrates are introduced.[19] Although the majority of the mothers (85%) knew that drinking baby formulas at night had a cariogenic potential, only half of them (51.18%) thought that nursing at night might also have a cariogenic effect. Given the recommendations of the World Oral Organization to continue breast feeding after the age of 6 months with appropriate complementary foods up to two years and beyond,[20] it is crucial to instruct mothers about the ways to minimize caries development risk during the nursing period.

Sugary food items have cariogenic effect and the best time to consume them is in proximity to meals.[21] Most of the mothers in our survey were aware of the need to limit the amount of sweets and snacks that their child consumes, but only 17.89% knew that the most significant factor in terms of oral health is the synchronization of their consumption.. The level of knowledge about the frequency of snacks consumption was correlated to the dentist as the major source of this knowledge. It follows, therefore, that it is essential to encourage dentists to explain the mechanism of caries development to the parents of young children. This goal may be difficult to reach since most of our participating mothers (57.54%) thought that the child's first visit to the dentist should be held by the age of 3 years. The AAPD recommends that the child's first dental visit should begin within six months of the eruption of the first tooth and no later than 12 months of age.[19] Since early colonization by *Streptococcus mutans* (SM) can occur as early as the age of 6 months and even before the eruption of teeth.[22]The earlier the dentist meets the parent and the child, the more substantial will be his/her influence on caries prevention.

Two-thirds of the mothers in this study stated that they usually tasted their child's food from his spoon to check that it was at the right temperature and for taste. This behavior has been associated with SM transmission, and it increases the risk of developing ECC in young ages.[23]We are confident that maternal knowledge of the possible consequences would put an end to it.

The mothers ranked toffee, a sugary sticky candy, as the most cariogenic food item in a list of six, and gave salty snacks the lowest score, similar to dark chocolate and ice cream. This result indicates their lack of knowledge about the carbohydrates and sugar content of these snacks. Again, we believe that heightened awareness of their potential harmful effect on oral health will motivate mothers to alter their choices of snacks for their youngsters.

One limitation of this study is that most of the mothers had an academic education. Further research is needed to evaluate KOH of caregivers with less than 12 years of education.

In conclusion, the findings of this study demonstrated that mothers of children aged 1-4 years had meaningful gaps in knowledge about issues which affect their children's oral health. This information may help devise better preventive strategies and educational programs for parents that will enable them to be exposed to the relevant information in prenatal and natal care facilities, with the goal of decreasing the risk for early bacterial transmission and ECC development.

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