

Full Length Research Paper

From Knowledge to Practice: Maternal Feeding Choices and Children's Oral Health

Luciana Reichert da Silva Assunção^{1*}, Karina Duarte Vilella¹, Jéssica Ellen Araújo¹, Maria Fernanda Pivetta Petinati¹, Débora Emi Shibukawa², Isabella Naomi Furuie² and Elaine Machado Benelli³

¹Department of Stomatology, Universidade Federal do Paraná, Jardim Botânico, Curitiba, PR, Brazil.

²Medical School, Universidade Federal do Paraná, Alto da Glória, Curitiba, PR, Brazil.

³Department of Biochemistry and Molecular Biology, Universidade Federal do Paraná, Jardim das Américas, Curitiba, PR, Brazil.

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The aim of the present study was to analyze the intentions and knowledge of mothers in the postpartum period regarding the feeding habits and oral health of their children. A cross-sectional study was conducted involving 286 mothers at a teaching hospital in Southern Brazil. The variables of interest were collected using a semi-structured questionnaire. Knowledge scores were analyzed numerically and dichotomized as adequate (score: >5) or poor (score: ≤5). Bivariate and multivariate Poisson regression analyses were performed and score ratios (SR) with respective confidence intervals (CI) were calculated. Most respondents were less than 25 years of age (55.6%), first-time mothers (56.4%) and demonstrated positive intentions regarding the majority of the aspects addressed. However, 65.4% of the sample demonstrated poor knowledge. Younger mothers, those with a lower income, those with less schooling, first-timers and those who reported intending to use sugar demonstrated less knowledge. Gathering information from the internet was associated with higher knowledge. The multivariate model revealed significant associations with having a university education (SR=1.23; CI: 1.12 to 1.35), having a high school education (SR=1.10; CI: 1.03 to 1.19), gathering information from the internet (SR=1.18; CI: 1.07 to 1.30), having given birth more than once (SR=1.13; CI: 1.06 to 1.21) and intending not to use sugar (SR=1.14; CI: 1.03 to 1.26). Schooling, number of child births, means of information and the use of sugar were independently associated with the knowledge score. There is a need to provide oral health education for women during the postpartum period in order to benefit oral health for both the mother and the baby.

Key words: Feeding behavior, infant, knowledge, mothers, oral health, postpartum period.

INTRODUCTION

Health behaviors are formed in the early years of life (Nourijelani et al., 2014). Therefore, mothers play an

*Corresponding author. E-mail: lurassuncao@yahoo.com.br. Tel: 55 41 3360-4025. Fax: 55 41 3360-4134.

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important role in the nuclear family regarding their health and the health of their children by passing on information and performing actions that can preserve the wellbeing and quality of life of their families (Moimaz et al., 2014). Since women had traditionally greater interaction with their children, the behavior of mothers exerts a direct social and behavioral influence on the health of children (Nourijelani et al., 2014).

Health education directed at women and children can have a positive impact during pregnancy and the postpartum period, which is a time of physiological, emotional and social transition for both mothers and infants (Chen et al., 2014). Thus, it is important for mothers to acquire adequate knowledge and positive health behaviors in this period (Mora and Nestel, 2007; Pentapati et al., 2013).

The introduction of healthy dietary practices is fundamental to child development and the prevention of adverse health conditions. Infants who were breastfed are at lower risk of developing autoimmune diseases, contracting infectious diseases and acquiring non-communicable diseases, such as obesity and chronic conditions (Verduci et al., 2014). World Health Organization recommends that complementary foods should be offered after the infant reaches six months of age (WHO, 1995), when the amount and composition of breast milk are no longer sufficient to meet the child's nutritional needs (World Health Organization, 2009). Adequate complementary foods offered at the right time help combat death due to diarrhea, pneumonia, measles and malaria (Jones et al., 2003). However, the premature introduction of complementary foods can be harmful to the child due to the greater risk of excess weight, obesity and chronic conditions in subsequent stages of life (Castro et al., 2014). On the other hand, if complementary foods are introduced too late, the child's growth and development can be compromised and there is an increased risk of malnutrition and nutrient deficiencies (UNICEF, 1998).

With regard to oral health, periodic nutritional and educational interventions have been shown to diminish the occurrence of cariogenic eating habits and delaying the introduction of sugar is potentially effective in establishing adequate eating habits in the first year of life (Vitolo et al., 2005). However, socioeconomic factors, such as a low household income, may be associated with a lower level of mother's schooling, lower degree of comprehension regarding the importance of health care and difficult access to health services (Nourijelani et al., 2014). Rothnie et al. (2012) found that younger women, first-time mothers and those with a low socioeconomic status did not have adequate knowledge regarding the oral health of their children.

Adequate oral health knowledge is an important precursor to adequate dental behavior (Abiola et al., 2011). Thus, it is important to identify gaps in knowledge and inadequate attitudes among mothers. The aim of the

present study was to analyze mothers' intentions and knowledge regarding the feeding habits and oral health of their children in the postpartum period. The inadequacies identified can serve as the basis for the establishment of educational and prevention strategies for this population.

MATERIALS AND METHODS

Women at postpartum period assisted at the Victor Ferreira do Amaral Maternity Hospital in the city of Curitiba, Brazil, between January and March, 2014 were asked to participate in the present study. This location was chosen because it is a teaching hospital linked to the Federal University of Paraná. Based on data from the hospital administration, 120 women, on average, were admitted monthly.

Four trained interviewers administered a semi-structured questionnaire to the mothers. This questionnaire had previously been tested for the determination of consistency in the questions and the possible need for changes on a sample of 30 women who did not participate in the main study. The questionnaire had 35 items divided among four sections. The first section (items 1 to 8) addressed socioeconomic and demographic characteristics of the respondent. The second section (items 9 to 15) addressed issues related to the respondent's oral health, such as visits to the dentist during pregnancy and self-perceptions regarding her teeth and mouth. The third section (items 16 to 28) addressed issues related to the respondent's perceptions and intentions regarding the eating habits of her child, including the importance of breastfeeding to the child's general health as well as the intention to use sugar and bottle feeding. The fourth section (items 29 to 35) addressed the respondent's notions regarding the child's oral hygiene.

The dependent variable was the knowledge score on aspects relating to children's eating habits and oral health. Eight statements were used to determine this score, for which 0 was attributed to incorrect responses and 1 was attributed to correct responses. Thus, the total score ranged from 0 to 8 points, with a higher score denoting greater knowledge. The definition of right or wrong for each statement was based on the specialized literature. "I don't know" responses and non-responses were scored as 0. The total was dichotomized as "adequate" (>5 points) or "poor" (≤5), based on the mean of the overall sample.

Associations between the dependent and independent variables were tested. The socioeconomic and demographic variables were age (categorized as less than 18 years, 19 to 25 years, 26 to 35 years and greater than 35 years), household income (categorized as four or more times the Brazilian minimum monthly wage [BMMW] = R\$724 at the time of the study), two to three times the BMMW and up to the BMMW), schooling (categorized as primary school, high school and university), occupation (categorized as paid activity and non-paid activity) and number of children (categorized as only one child and two or more children). With whom the respondent resided was also analyzed (categorized as with or without a partner). Associations between the dependent variable and sources by which the respondents maintained themselves informed were also tested. The oral and general health of the respondents during pregnancy, the respondents' self-perception of their oral health status and whether they received information regarding their children's oral health during pregnancy were analyzed. Mothers' intentions regarding breastfeeding, bottle feeding, pacifier use and the use of sugar in milk were also analyzed.

The Kolmogorov-Smirnov test demonstrated that the knowledge score had non-normal distribution. Thus, nonparametric tests (Mann-Whitney U test and Kruskal-Wallis test) were used for the bivariate analysis. A Poisson multivariate regression model was

Table 1. Distribution of responses to eight statements used to evaluate knowledge (Curitiba, PR, Brazil, 2014).

Statements	Responses			Total* [n (%)]
	True [n (%)]	False [n (%)]	Uncertain [n (%)]	
1. Breastfeeding is an important practice for the prevention of diseases in newborns.	242 (85.2)	0	42 (14.8)	284 (100)
2. Breastfeeding assists in the development of the face and teeth in infants.	54 (20.0)	168 (62.3)	48 (17.7)	270 (100)
3. An infant can begin to eat solid foods at six months of age.	170 (61.2)	9 (3.2)	99 (35.6)	278 (100)
4. Solid foods are important to the facial development of infants.	167 (60.2)	29 (10.4)	82 (29.4)	278 (100)
5. Infants acquire first contact with the outer world through the mouth.	235 (84.2)	37 (13.3)	7 (2.5)	279 (100)
6. Primary teeth are indispensable to the health of children.	163 (59.0)	88 (31.7)	26 (9.3)	277 (100)
7. Hygiene is important for the prevention of cavities in primary teeth.	264 (94.6)	2 (0.7)	13 (4.7)	279 (100)
8. Using a bottle with sugary liquids at night can lead to the development of cavities.	26 (9.2)	20 (6.9)	240 (83.9)	286 (100)

*Frequencies less than 286 due to missing data

constructed to investigate associations between the dependent (knowledge score) and independent variables, with the calculation of score ratios (SR) in each category in relation to a reference category and respective 95% confidence intervals (CI). Values equal to 1 indicate equality in the mean scores of the two groups, whereas values higher and lower than one, respectively indicate a higher and lower mean score in comparison to the reference group (Andrade et al., 2012). All independent variables with a p -value <0.25 in the univariate analysis were incorporated into the multivariate model. As the level of significance was set at 5%, variables with a p -value ≤ 0.05 after the adjustments were maintained in the model. The STATA program (version 12.0) was used for the statistical analyses.

This study received approval from the Human Research Ethics Committee of the Sector of Health Sciences of the Federal University of Paraná under process number 28785314.4.0000.0102. Informed consent was obtained from all participants prior the execution of the research.

RESULTS

Three hundred and ten women were asked to participate in the study, 24 of whom refused, leading to a total of 286 mothers interviewed.

The level of knowledge was categorized as poor in 65.4% of the sample. A greater number of correct responses were found for items related to the hygiene of primary teeth and the importance of breastfeeding to a child's health. A greater number of incorrect responses were found for items related to the benefit of breastfeeding to the child's facial formation and the association between bottle feeding and dental caries (Table 1).

Mean age of the participants was 26.2 ± 3.3 years (range: 14 to 38 years). The largest portion of the sample was in the 19 to 25-year-old age group (38.1%), had a high school education (55.4%) and a household income between two and three times the BMMW (45.4%). Moreover, 74.1% lived with their partner and 56.4% were first-time mothers. Television was the main means of communication by which the participants maintained themselves informed (37.4%). Younger mothers ($p = 0.002$), those with a lower income ($p = 0.035$), those with less schooling ($p = 0.001$) and first-time mothers ($p = 0.004$) had significantly lower knowledge scores, whereas

women who maintained themselves informed through the internet had significantly higher knowledge scores ($p = 0.008$) (Table 2).

Most participants had no general or oral health problems during pregnancy (69.7 and 68.8%, respectively), visited a dentist during pregnancy (62.6%) and felt that their teeth had a healthy appearance (65.4%). A total of 52.6% of the participants had received orientations regarding their oral health during pregnancy, but only 23.2% had received information regarding their child's oral health. No significant associations were found between these variables and the knowledge scores (Table 3).

The majority reported intending to breastfeed their children (96.8%), would not add sugar to milk (82.3%) and would offer a bottle (75.5%), but would not offer a pacifier to their children (63.6%). Mothers who reported the intention to add sugar to milk had significantly lower knowledge scores ($p = 0.049$) (Table 4).

Table 5 displays the results of the Poisson multivariate regression analysis. The model revealed significant associations with having a

Table 2. Associations between knowledge score and socioeconomic/demographic data and source of information (Curitiba, PR, Brazil, 2014).

Variable	n* (%)	Mean	p
Age (years)			
18 or younger	50 (17.5)	4.3	0.002
19 to 25	109 (38.1)	4.0	
26 to 35	99 (34.6)	5.1	
36 or older	28 (9.8)	5.2	
Schooling			
University	29 (10.2)	5.52	0.001
High school	158 (55.4)	4.87	
Primary school	98 (34.4)	4.38	
Income			
4 or more times the BMMW	62 (23.8)	5.05	0.035
2 to 3 times the BMMW	118 (45.4)	4.82	
Up to times the BMMW	80 (30.8)	4.45	
Occupation			
Paid activity	145 (54.3)	4.9	0.277
Non-paid activity	122 (45.7)	4.6	
Resides with partner			
Yes	212 (74.1)	4.75	0.880
No	74 (25.9)	4.77	
Number of children			
One	149 (56.4)	4.51	0.004
Two or more	115 (43.6)	4.97	
Source of information			
TV	107 (37.4)	4.43	0.008
Radio	4 (1.4)	5.0	
Newspaper	3 (1.0)	5.0	
Internet	29 (10.1)	5.38	
Other	7 (2.4)	3.86	
More than one source	136 (47.6)	4.92	

BMMW: Brazilian monthly minimum wage; *Frequencies less than 286 due to missing data. Significant differences at 5% level in bold.

university education (SR =1.23; 95% CI: 1.12 to 1.35), having a high school education (SR = 1.10; 95% CI: 1.03 to 1.19), gathering information from the internet (SR = 1.18; 95% CI: 1.07 to 1.30), having given birth more than once (SR = 1.13; 95% CI: 1.06 to 1.21) and intending not to use sugar (SR = 1.14; 95% CI: 1.03 to 1.26).

DISCUSSION

The attitudes of caregivers, especially mothers, seem to

exert a significant influence on the oral health status of children (Nourijelani et al., 2014; Adeniuy et al., 2009). The present study was conducted to determine the knowledge and intentions of mothers regarding the eating habits and oral health of their newborn children. The degree of knowledge was considered poor among 65.4% of the participants. This finding differs from data reported in studies conducted in other countries, such as Nigeria (Eigbobo and Onyeaso, 2013), India (Pentapati et al., 2013) and Australia (George et al., 2013), in which a

Table 3. Associations between knowledge score and general/oral health problems during pregnancy, self-perceived oral health, previous information and visit to dentist (Curitiba, PR, Brazil, 2014).

Variable	n* (%)	Mean	p
General health problems during pregnancy			
Yes	86 (30.3)	4.04	0.734
No	198 (69.7)	4.72	
Oral health problems during pregnancy			
Yes	89 (31.2)	4.01	0.861
No	196 (68.8)	4.73	
Feels healthy with teeth and mouth			
Yes	187 (65.4)	4.74	0.859
No	98 (34.3)	4.78	
Previous information on oral health - mother			
Yes	150 (52.6)	4.02	0.269
No	135 (47.4)	4.68	
Previous information on oral health - child			
Yes	66 (23.2)	4.71	0.880
No	218 (76.8)	4.77	
Visited dentist during pregnancy			
Yes	179 (62.6)	4.02	0.312
No	107 (37.4)	4.66	

*Frequencies less than 286 due to missing data.

Table 4. Associations between knowledge score and intentions regarding eating habits and oral health (Curitiba, PR, Brazil, 2014).

Variable	n* (%)	Mean	p
Intends to breastfeed			
Yes	274 (96.8)	4.75	0.862
No	9 (3.2)	4.67	
Would add sugar to milk			
Yes	50 (17.7)	4.32	0.049
No	232 (82.3)	4.86	
Would offer bottle			
Yes	206 (7.5)	4.77	0.579
No	67 (24.5)	4.64	
Would offer pacifier			
Yes	100 (36.4)	4.57	0.243
No	175 (63.6)	4.83	

*Frequencies less than 286 due to missing data. Significant difference at 5% level in bold.

large percentage of pregnant or nursing women demonstrated adequate oral health knowledge.

The item related to the importance of oral hygiene to

prevent dental caries in the primary dentition had the greatest number of correct responses, whereas most mothers were unaware of the association between dental

Table 5. Poisson multivariate regression model for associations between knowledge score and variables of interest (Curitiba, PR, Brazil, 2014).

Variable	Score ratio (crude) 95% CI	p	Score ratio (adjusted) 95% CI	p
Schooling				
Primary school	1	-	1	-
High school	1.11 (1.03-1.20)	0.009	1.10 (1.03-1.19)	0.009
University	1.26 (1.15-1.39)	<0.001	1.23 (1.12-1.35)	<0.001
Source of information				
TV	1	-	1	-
Radio	1.13 (0.89-1.45)	0.340	1.07 (0.76-1.50)	0.702
Newspaper	1.13 (0.80-1.57)	0.468	1.11 (0.85-1.44)	0.424
Internet	1.21 (1.10-1.35)	<0.001	1.18 (1.07-1.30)	0.001
Other	0.87 (0.70-1.06)	0.176	0.84 (0.70-1.00)	0.059
More than one source	1.11 (1.02-1.20)	0.008	1.07 (1.00-1.15)	0.065
First child birth				
Yes	1	-	1	-
No	1.10 (1.03-1.18)	0.004	1.13 (1.06-1.21)	<0.001
Would add sugar to milk				
Yes	1	-	1	-
No	1.13 (1.01-1.25)	0.039	1.14 (1.03-1.26)	0.015

CI: Confidence interval. Significant differences at 5% level in bold.

caries and night time bottle feeding with sugar added to the milk. In a qualitative study conducted in the United States, the 48 American and Mexican mothers interviewed demonstrated adequate knowledge regarding the role of sugar in the etiology of dental caries, but limited knowledge on the influence of the frequency of sugar intake (Hoeft et al., 2013). In a study conducted in Nigeria, only 30.2% of the women interviewed considered sugar to be one of the causes of dental caries (Abiola et al., 2011).

Socioeconomic and demographic factors exerted a strong influence on the degree of knowledge demonstrated by the women interviewed in the present study. The bivariate analysis revealed that younger mothers, those with a lower income, those with less schooling and first-time mothers had less knowledge regarding the eating habits and oral health of their children. Previous studies have also found that women with a higher level of education demonstrate greater knowledge regarding oral health (Pentapati et al., 2013; Abiola et al., 2011; Eigbobo and Onyeaso, 2013; Bamanikar and Kee, 2013). A higher level of education may also lead to greater access to information regarding health care and the use of health services (Fisher-Owens et al., 2007). In the multivariate analysis, mothers with more schooling had a 26% higher score ratio than those with less schooling.

Socioeconomic status was also evaluated based on

household income. Women from more economically privileged families had higher knowledge scores than those from less privileged families. Low income may also be associated with a lower level of schooling and inadequate understanding regarding the value of health as well as less access to health services (Nourijelani et al., 2014; George et al., 2013). Indeed, studies report a greater prevalence rate of dental caries among children from less privileged families (Nourijelani et al., 2014; Moimaz et al., 2014). However, income was not significantly associated with the knowledge score in the multivariate analysis, which suggests a greater association with other socioeconomic variables, such as schooling.

Younger mothers and first-time mothers had significantly lower knowledge scores, which is in agreement with data reported by Rothnie et al. (2012). However, age lost its statistical significance in the adjusted multivariate model, demonstrating that this variable was not associated with the degree of knowledge independently of schooling and number of child births.

The increase in the use of new information and communication technologies in developing countries has contributed substantially to the knowledge-building process (Nattestad, 2012). The present findings confirm this premise, as mothers who gathered information from the internet had higher knowledge scores than those who

used other sources of information. Moreover, mothers with a higher level of schooling had significantly greater access to the internet in comparison to those with less schooling (data not shown), which demonstrates the influence of other variables regarding access to this source of information. According to Antheunis et al. (2013), a large portion of users of health services in the Netherlands seek information regarding adverse health conditions and treatment through the internet. The internet is a dynamic form of knowledge building that allows users greater freedom in gathering information (Santana et al., 2011). None of the items related to dental issues, such as previous information on oral health and visits to the dentist, exerted a significant influence on knowledge scores in the present study. A recent study reports that health information does not only come from healthcare professionals and other sources, such as electronic means of communication, are also related to the acquisition of knowledge (Oredugba et al., 2014). Moreover, although most of the women in the present study visited a dentist during pregnancy, the vast majority (76.8%) did not receive information regarding the oral health of their children. A previous study has reported that Latin women may not have sufficient knowledge regarding the oral hygiene of their children, including the technique and frequency of brushing primary teeth (Hoeft et al., 2010). The present findings underscore the need for educational measures regarding these aspects for mothers in the prenatal period.

The behavior of mothers exerts a strong influence on the health of children (Adeniuy et al., 2009). Thus, children of mothers with adequate oral hygiene and eating practices are more likely to have a lower frequency of dental caries (Nourijelani et al., 2014; Saied-Moallemi et al., 2008). In the present study, the association between intentions and knowledge was only significant with regard to the use of sugar, as mothers who reported they would add sugar to milk had lower knowledge scores. This intention may be strongly related to the concretization of eating habits in children (Swanson et al., 2011). However, knowledge and attitude cannot be analyzed as a simple linear cause-and-effect relationship (Adeniuy et al., 2009). Although adequate knowledge is a precursor for the occurrence of correct behavior, other aspects should be taken into consideration, such as beliefs and cultural factors (Okada et al., 2002).

The present study has limitations that should be addressed. As a non-probabilistic sample was used, the generalization of the findings requires caution. The fact that the study was conducted at a single hospital limited the characteristics of the sample, which does not allow the extrapolation of the findings to other populations. Moreover, the use of self-reports may have led to some systematic errors.

Despite these limitations, the results of the present study reveal important gaps in knowledge among

mothers in the postpartum period regarding the eating habits and oral health of their children. Educational measures are needed for this population, especially mothers with a lower socioeconomic status and those giving birth for the first time.

Conclusion

Schooling, number of child births, means of information and the use of sugar were independently associated with the knowledge score. There is a need to provide oral health education for women during the postpartum period in order to benefit oral health for both the mother and the baby.

Conflicts of interest

The authors declare that they have no conflict of interest.

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