

Do Maternal Beliefs, Knowledge and Practices for Own and Young Child Oral Care Reflect on Actual Child Oral Health?

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ABSTRACT

Aim: The aim of the present study was to evaluate whether mother's oral health habits and knowledge for child oral care actually reflect on her young child's oral health and hence sought for direct evidence for this association.

Materials and methods: One hundred mothers accompanied their children, aged 2–5 years to a University Paediatric Dentistry Clinic and completed a three-arm questionnaire. Child dental caries (decayed, missing, filled surfaces–dmfs) and gingival bleeding index (GBI) were recorded. Correlations were sought by the analysis of variance (ANOVA).

Results: A negative correlation was observed between maternal education and family income with child dmfs ($p < 0.01$). Additionally, other maternal factors such as age and correct knowledge of the appropriate age for a child's first dental visit, the initiation of toothbrushing, and fluoride exposure were positively associated with lower dmfs and GBI. Additionally, some maternal practices also contributed to these results.

Conclusion: Maternal practices and knowledge are predictors of child oral health.

Clinical significance: Mothers-to-be, especially those with low socioeconomic characteristics, should be involved in dental education and motivation interventions in order to practice proper oral hygiene for their children.

Keywords: Child oral health, Dental caries, Family income, Gingivitis, Maternal education.

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INTRODUCTION

Dental caries, the commonest chronic childhood disease in most societies, has adverse health and economic consequences for young children and their families. Socioeconomically disadvantaged children run a higher risk of primary teeth both for developmental dental defects and for early childhood caries (ECC).¹ Moreover, health problems during late pregnancy may increase the risk for enamel defects and caries in the primary dentition,² with the risk being even greater at the posterior primary teeth.³ Therefore, prevention of dental disease should start at gestation period. An unhealthy diet, excessive use of medication, smoking, alcohol consumption, and other pregnancy and/or birth complications can have a direct or indirect impact on the fetus and increase the risk of dental disease in the future.⁴ It is also crucial for oral health to delay the transfer of cariogenic bacteria, especially *Streptococcus mutans*, from mother to baby after birth.⁵ Following the eruption of primary teeth, practicing good oral hygiene is among the child caring priorities.

Women when pregnant or as new mothers are more sensitive to recommendation on their children's health issues. Oral health community programs rightly target this early period.^{6,7} There have been numerous reports that parents' knowledge and practices significantly influence their children's oral hygiene behavior, as repeatedly reported for preschool,^{8,9} and schoolchildren.^{10,11} Many studies are contained on self-reported questionnaires completed by mothers^{12,13} or indirectly estimate child's oral health effects through brushing frequency and/or technique.^{9,11} Using indices such as decayed, missing, filled teeth or decayed, missing, filled surfaces (dmfs) to assess a child's oral health offers a more objective and quantifiable evaluation of their oral health. However, the impact of maternal awareness and expressed intentions on actual child oral health expressed by relevant indices has been much less frequently

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documented.^{14,15} Adding to this scarcity of direct evidence, a recent review has concluded that providing advice on diet and feeding to pregnant women, mothers, or other caregivers with children up to the age of one year probably leads to a slightly reduced risk of ECC.¹⁶ Therefore, there is still room for further substantiating this relationship between good maternal knowledge and practices with the actual result these are expected to have on their young children's oral health.

Epidemiological studies have emphasized the influence of socioeconomic factors, education level in particular, on child oral health.^{17,18} Although social factors are not amenable to change, behavioral factors could be modified, among others with oral care education and attitude change for new mothers. Documenting the direct association between maternal beliefs and attitudes with their young children's oral health would offer better evidence-based support to such preventive campaigns for mothers-to-be and new mothers at a community level. The aim of the present

Table 1: Mothers' demographics

Age-group	%	Education	%	Employment	%	Family annual income (€)	%	Nationality	%	Marital status	%
21–25	3	High school	8	Unemployed	28	<10,000	36	Greek	91	Married	92
26–30	17	Senior high/tech school	31	Employee (private/public)	39	10,001–20,000	37	Other	9	Single parent	8
31–35	39	University	39	Self-employed	24	>20,000	27				
36–40	19	Master's degree	22	Other	9						
>40	22										

study was to seek (1) the relationship between maternal oral health knowledge and practices for both their own and offspring's teeth with child's oral health indices and (2) factors influencing these associations.

MATERIALS AND METHODS

This research received authorization from the Aristotle University School of Dentistry's Ethics Committee (approval number 29/21-11-2018). At least 100 mother–child dyads were considered an adequate sample, with an additional 10% added for misfiled questionnaires or impossible child examinations.⁸ A sample of mothers who brought their 2- to 5-year-old children for their first visit to the postgraduate pediatric dental clinic between January 2019 and February 2020 was recruited as subjects. Once the purpose of the study had been explained, the mothers were requested to affix their signatures on an informed consent form. Following this, they were provided with a two-page anonymous questionnaire written in the Greek language. The authors designed the questionnaire, which was completed by each mother in the waiting room, immediately before their child's initial clinical examination. The following were the exclusion criteria: (1) language barrier with patient's mother and (2) mother accompanying child with a disability that impeded the implementation of routine oral health home care.

Questionnaire for Mothers

This was a three-arm questionnaire with 25 close-ended questions (most of them being yes or no questions): (1) six demographic questions covering socioeconomic factors such as education, family income, and occupation, as outlined by Boka et al.¹⁹ (2) Ten questions regarding the mother's awareness and personal oral health habits during pregnancy, including topics like smoking, oral hygiene, and dental appointments. (3) Nine questions addressing the mother's understanding of her child's oral care, including oral hygiene, feeding practices related to tooth decay, and other habits. The lead researcher was present during the process in order to provide clarifications when necessary. In order to get the percentages for a question, we had to count the answers and divide it with the total number of participants.

Clinical Child Examination

A calibrated dentist (A.F.) performed children's dental examinations for caries (using the dmfs index) and gingival bleeding index (GBI), adhering to the World Health Organization's guidelines for documenting children's dental health.²⁰ For ethical reasons, no X-rays were taken for the purposes of this study. All children were in full primary dentition.

The GBI was determined by the lack or occurrence of bleeding upon gently probing the gingival crevice with a blunt periodontal probe.²¹ A positive score was assigned if bleeding took place within 10–15 seconds. The total number of positive units was divided by

the number of gingival margins assessed, and the outcome was multiplied by 100 to represent the index as a percentage.²²

A subsample of 20 children were re-examined by the same dentist with one-week interval under identical conditions. The intra-examiner correlation coefficient was determined to be 0.91. The clinical examination outcomes were documented using a coding system, which included the child's age, enabling a blind matching process with the corresponding questionnaires.

Statistical Analysis

All the data collected were analyzed using the SPSS (version 24.0). Continuous variables such as age, dmfs, etc., were expressed as mean with standard deviation (SD) and categorical variables such as the level of education as percentages. The comparison of the continuous quantitative variable in the independent samples, where the population was divided into two categories, was performed using the Mann–Whitney test. The one-way analysis of variance (ANOVA) test and the *post-hoc* analysis Bonferroni were used in order to compare the continuous quantitative variable in the independent samples, where the population was divided into more than two categories. The comparison of the continuous variables was performed using the Pearson's correlation test. The level of significance was set at $p < 0.05$.

RESULTS

Out of 112 mother–child dyads recruited, 10 were excluded from the study based on misfiled questionnaires or the exclusion criteria set, and 2 more mothers denied participating for personal reasons. This is an excellent response rate calculated approximately 90%. Table 1 presents descriptive percentage statistics of questionnaire arm 1 responses, providing information on the maternal demographics of the 100 participants. The mean (+SD) age of child's first visit was 3.8 years old (+0.6). The 31- to 35-year-old age-group (39%) and the higher education graduate (39%) mothers outnumbered the other respective groups. The majority were of Greek decent (91/100) and married (92/100).

Thirty three new mothers visited a dentist during pregnancy and for 20 of them the visit was urgent due to dental problems (root canal filling, tooth abscess, and pain). More than half women (52%) brushed their teeth twice daily. Approximately 82% did not change their daily oral care routine during pregnancy, and 18% and 23% were informed about oral health from their social network and through internet/tv/social media, respectively.

Table 2 displays the descriptive percentage statistics of responses from questionnaire arm 2, which reflects mothers' knowledge of oral health and their dental care practices during pregnancy.

Regarding attitudes and knowledge about their children's oral health: An overwhelming percentage of mothers (94%) considered health and maintenance of primary dentition until normal

Table 2: Mothers’ oral health knowledge and practices for own teeth

How often did you brush your teeth during pregnancy?	Twice daily: 52%	Once or less daily: 41%	More than twice daily: 7%
Did your toothpaste contain fluoride?	Yes: 78%	No: 5%	Do not know: 17%
Did you floss regularly or used other interdental aids during pregnancy?	Yes: 28%	No: 72%	
Did you smoke during pregnancy?	Yes: 11%	No: 89%	
Have you been visiting the dentist on a regular basis?	≤every 12 months: 49%	≥24 months/at emergency: 51%	
Why do you usually visit the dentist?	Routine dental exam: 40%	Dental problem: 60%	
Did you visit the dentist during pregnancy?	Yes: 33%	No: 67%	
If “yes” did you have to visit the dentist as emergency?	Yes: 25%	No: 8%	
Which trimester of pregnancy do you think safer for dental treatment?	Second trimester: 39%	Any other/all /Do not Know: 61%	
Do you think your own oral health could influence that of your child?	Yes: 58%	No: 22%	Do not know: 20%

Table 3: Mothers’ knowledge/practices for their offspring’s oral health

Do you believe that preserving primary teeth (until exfoliation) is essential?	Yes: 94%	No: 6%	
At what age should you start brushing your child’s teeth?	<1 yr old: 70%	>2 yr old: 30%	
Should children use fluoridated toothpaste?	Yes: 52%	No: 22%	Do not know: 26%
If “yes”, at what age is it safe to use fluoride toothpaste?	>1 yr old: 21%	>2 yr old: 29%	Do not know: 2%
At what age should children start brushing their teeth on their own?	>3 yr old: 36%	>5 yr old: 42%	>8 yr old: 22%
When should a child visit a dentist for the first time?	1 yr old: 11%	2–4 yr old: 69%	Older/dental problem: 20%
Does at will long-term breastfeeding at night cause dental decay?	Yes: 28%	No: 44%	Do not know: 28%
Does at will long-term bottle feeding at night cause dental decay?	Yes: 55%	No: 13%	Do not know: 32%
Could pacifier or thumb-sucking cause dental problems?	Yes: 79%	No: 11%	Do not know: 10%

exfoliation as really important. Approximately 82% claimed that the frequency of brushing should be twice daily, but 56% used the wrong amount of toothpaste for their child (smaller amount or too much). Only 11 mothers reported that the first dental visit should start no later than the child’s first birthday. However, their children were already older than 1 year when they visited the pediatric dental clinic. Table 3 presents the descriptive percentage statistics of responses from questionnaire arm 3, highlighting mothers’ understanding and intended actions regarding their children’s oral health.

The mean (+SD) dmfs of all 2- to 5-year-old children of this convenience sample was 4.9 (+8.0) and the mean GBI was 2.6%. Table 4 demonstrates the statistically significant correlations

between children’s oral health status (dmfs and GBIs) and their mothers’ knowledge or practices, as described in Tables 2 and 3. Both maternal education and family income were statistically significantly associated with child dmfs ($p < 0.01$), while family income only was likewise associated with GBI. Other maternal knowledge and own practices factors were predictors of any of the two child oral health parameters as shown in Table 4.

DISCUSSION

This study aimed to evaluate whether and how a mother’s personal oral care knowledge, related practices, and understanding of child oral care directly influence their preschool child’s oral health.

Table 4: Statistically significant associations between child better oral health status (dmfs and GBIs) and mother's knowledge/practices of own and child's oral health

Child had significantly lower DMFS	
– Mother of higher education	($p < 0.01$)
– Mother age older (by dividing into age clusters)	($p = 0.013$)
– Mother of Greek origin (as opposed to all other)	($p < 0.01$)
– Mother is married	($p = 0.049$)
– High-income family	($p < 0.01$)
– Mother visited the dentist regularly	($p = 0.036$)
– Mother attended routine dental recall	($p < 0.01$)
– Mother believed her dental status could possibly affect her child's	($p = 0.036$)
– Mother believed taking care of primary teeth is essential	($p < 0.01$)
– Child started having teeth brushed at a younger age	($p < 0.01$)
Child had significantly lower GBI	
– High-income family	($p < 0.01$)
– Mother did not smoke during pregnancy	($p = 0.046$)
– Child was exposed to fluoride toothpaste at a younger age	($p = 0.024$)
– Child had teeth brushed more than once a day	($p = 0.042$)
– Children had first dental visit by age 1 yr	($p < 0.01$)
– Mothers believed taking care of primary teeth is essential	($p < 0.03$)

To achieve this, mother–child pairs were enlisted, and maternal knowledge and practices were assessed using a suitably designed questionnaire. Meanwhile, the child's oral health was objectively evaluated using caries and periodontal health indices. As a significant maternal sociodemographic factor has been associated with this relationship,^{17,18} the questionnaire's first arm was designed to address this aspect. Numerous statistically significant associations demonstrated the impact of socioeconomic factors and the predictive capacity of maternal knowledge and practices on a child's oral health. These have shown to be significant oral health determinants.^{17,23,24} A systematic review by Hooley et al. revealed that parents with higher education levels generally exhibit more positive attitudes and are more likely to monitor their children's health behavior compared to parents with lower education levels.²⁵ On the other hand, low-income family parents have more negative perception of their child's oral health according to Shihadeh et al.²⁶

Therefore, the present study supported a direct association between maternal characteristics and preschool child oral health. The results of multivariate analysis showed that many factors like mother's educational level, older maternal age, ethnicity, family income, attending the dentist routinely, belief that care for primary teeth is essential, and having started child tooth brushing early were very significantly associated ($p < 0.01$) with lower caries of their child. High family income and having the child first dental visit by age 1 were the strongest statistically significant associations ($p < 0.01$) with healthy child gingivae.

Regarding maternal practices for own oral health, 33% of the new mothers in the present study visited a dentist during pregnancy, the majority (25/33) as an emergency in line with studies by Al-Swuailem et al. and Zhong et al. showing that women decrease or even pause routine dental checkups during pregnancy.^{27,28} Despite appearing to recognize the significance of routine dental

appointments, only a limited number of pregnant women actually visited the dentist during their pregnancy.¹² Mothers' oral health knowledge and self-efficacy can be potentially altered. Consistent dental visits enhance these aspects by reinforcing proper brushing habits, promoting healthy behavior and dietary guidance, or even providing basic encouragement.²⁹ The current study supports the idea that these healthy habits may be transmitted to children; children's DMFS index was lower when mothers maintained regular dental visits, which reinforces the importance of routine preventive dental appointments during pregnancy. Mothers are role models for their children. Dye et al. have even shown direct associations of oral health between mother and her child.³⁰

During pregnancy, approximately half of the mothers (52/100) brushed their teeth twice a day. This percentage is lower compared to reports from other countries such as Denmark (96%),³¹ the United Kingdom (73.7%),³² Saudi Arabia (77%),³³ and India (64%).¹² The majority did not use any form of interdental aids (72%). This broadly agrees with reports from Jordan and Switzerland³⁴ that low percentages 8.4% and 24% of pregnant women, respectively, used additional measures to brushing alone for their oral hygiene.

In the present study, 70% of mothers accurately believed that brushing should commence before their child's first birthday, while only 22% opposed the use of fluoridated toothpaste. Maternal awareness for these proper oral hygiene practices regarding their child is of less value, however, as attitudes and everyday practice are more important than merely knowledge.¹⁵ The high mean DMFS (4.9) and GBIs (2.6%) observed in the children may raise doubts about whether mothers adhere to the recommendations and/or implement them correctly. On the other hand, these high indices belong to a convenience sample of preschoolers presenting mainly for treatment at a university clinic. They differ widely from preschooler representative samples at kindergartens from the same city, one of municipal and one of private ones, showing 1.3 and 0.4 DMFS, respectively.^{35,36}

An overwhelming majority of mothers (94%) deemed the health and upkeep of primary dentition until natural exfoliation as highly important. However, the high DMFS value in this convenience sample suggests that this priority was not reflected in these families. Recognizing and meeting the treatment needs of primary teeth depend largely on culture³⁷ and possibly to other family factors to a lesser extent, e.g., maternal age, with children of younger mothers being at higher risk as demonstrated by Mattila et al.³⁸ The sample of the present study could comprise a rather high risk target group to which counseling interventions starting at pregnancy would have been of value.

The following study limitations may be considered: (1) the questionnaire data are self-reported based also on closed-ended answers for statistical analysis purposes, therefore answers could be given even at lack of knowledge and thus carry potential bias; (2) oral health-related maternal behaviors reported may have been affected by pregnancy complications; (3) although mothers generally have greater control over their preschool children's diets, the potential impact on their caries index remains largely unclear, and (4) the fact that the mothers visited a university pediatric dental clinic means that this sample, while encompassing families from various social classes, may not be entirely representative of the overall population.

CONCLUSION

The findings of the present study reaffirm the direct links between maternal knowledge, practices, and their children's oral health,

underscoring the importance of engaging expectant mothers in dental education and motivational interventions, particularly those with low socioeconomic backgrounds.

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