

Impact of Maternal Education Status on the Duration of Breastfeeding and Its Association with Various Oral Health Parameters

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ABSTRACT

Background: Breastfeeding is widely acknowledged as beneficial for both infant and maternal health. Maternal education significantly influences breastfeeding practices, which can, in turn, impact children's oral health outcomes. The purpose of this study was to explore the relationship between maternal education status and the duration of breastfeeding and its association with various oral health parameters in children aged 2–5 years.

Methodology: The study employed a cross-sectional observational design, examining 188 dyads comprising mothers and their children. A structured questionnaire was employed to gather information on maternal education, breastfeeding practices, and demographic characteristics, which was subsequently complemented by an oral health assessment of the children. Primary outcome measures included breastfeeding duration and oral health parameters, such as dental caries, oral hygiene [assessed using the Simplified Oral Hygiene Index (OHI-S)], and malocclusions. Statistical analysis was performed using descriptive statistics, *t*-tests, analysis of variance, Chi-square tests, and multiple linear regression analysis to identify independent predictors of the outcomes.

Results: Mothers with higher education breastfed for a significantly longer duration (mean: 11.8 ± 3.1 months) compared with those with lower education (mean: 8.4 ± 2.6 months) ($p < 0.001$). Children who were breastfed for 6 months or more had better oral hygiene scores (mean OHI-S: 1.5 ± 0.4) compared with those breastfed for less than 6 months (mean OHI-S: 2.1 ± 0.6) ($p < 0.001$). However, prolonged breastfeeding beyond 12 months was associated with an increased risk of malocclusions ($\chi^2 = 7.45, p = 0.006$). Multiple linear regression analysis confirmed maternal education as a significant predictor of both breastfeeding duration ($\beta = 0.42, p < 0.001$) and oral hygiene status ($\beta = -0.31, p = 0.002$).

Conclusion: This study highlights the significant role of maternal education in promoting longer breastfeeding duration and better oral health outcomes in children. However, extended nursing was associated with an increased risk of dental malocclusion. These findings highlight the importance of targeted community health programs focusing particularly on breastfeeding education and oral healthcare guidance, particularly for mothers with lower educational attainment.

Keywords: Breastfeeding duration, Child health, Dental caries, Malocclusions, Maternal education, Oral health.

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INTRODUCTION

The practice of breastfeeding is crucial for the development of immune system, cognitive abilities, and overall health in children. However, the duration and prevalence of breastfeeding vary substantially across populations, driven by a variety of socio-demographic factors, including the mother's educational attainment.

Maternal education constitutes a significant factor influencing the process of initial lactation and duration of breastfeeding. Mothers with higher educational attainment are more likely to practice exclusive breastfeeding for the recommended duration. This association is primarily due to their improved access to information regarding the benefits of breastfeeding, as well as their increased competence in addressing and overcoming potential challenges that may arise during the breastfeeding process.¹ Moreover, educated mothers may have greater access to healthcare resources, which can support sustained breastfeeding practices. Conversely, mothers with lower educational attainment may face barriers, such as lack of knowledge, support, or resources, leading to shorter breastfeeding durations.²

The duration of breastfeeding is correlated with a range of oral health outcomes in children. Prolonged breastfeeding, particularly

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beyond the recommended period, may be linked with an elevated risk of dental caries. While breast milk is typically less cariogenic than formula, it still contains lactose, which can contribute to the progression of dental caries in the absence of adequate oral hygiene practices. Such considerations are paramount while evaluating the implications of breastfeeding duration on the oral health

of children.³ Furthermore, breastfeeding practices can influence the development of the child's oral and facial structures. Proper breastfeeding technique promotes healthy jaw development and alignment, reducing the risk of malocclusions later in life. Prolonged or improper breastfeeding practices may contribute to dental complications, including anterior open bite and posterior crossbite. It is important to be aware of these potential issues in order to promote optimal oral health in infants.⁴

The aim of this study was to determine the impact of maternal education status on breastfeeding length and its association with a variety of other oral health parameters among children. Understanding these relationships enables healthcare providers to better encourage breastfeeding and promote optimal oral health outcomes in children. The findings of this study would help construct public health programs aimed at improving breastfeeding instruction and support, particularly in populations with lower educational attainment.

Numerous studies in the past have observed the relationship between maternal education and breastfeeding duration, and the implications for children's oral health. For example, Li et al. in their study observed that mothers with greater level of educational achievement were more likely to exclusively breastfeed for six months, which correlated with better oral health outcomes in their children.¹ Similarly, an investigation by Azevedo et al. highlighted the correlation between prolonged breastfeeding and an increased risk of dental caries, emphasizing the need for oral hygiene education alongside breastfeeding support.² Furthermore, Kramer et al. demonstrated that adequate breastfeeding practices, which are generally more accessible to educated mothers, play a substantial role in the development of healthy oral structures.³ Other studies have corroborated these findings, showing that maternal education is a significant predictor of both breastfeeding practices and oral health in children.^{4,5}

METHODOLOGY

This cross-sectional study, which was observational in nature, was carried out in the Department of Public Health Dentistry, People's College of Dental Sciences & Research Center in Bhopal. The primary goal was to investigate the influence of maternal education status on breastfeeding duration and its relationship with several oral health markers in children aged 2–5 years. Mother–child pairs who visited pediatric dental clinics and primary healthcare centers in the region were enrolled for this study.

The study comprised a total of 188 mother–child pairs. This sample size was determined in order to obtain statistical power to identify significant relationships between maternal education level, breastfeeding duration, and children's oral health outcomes. The sample size was calculated based on the estimated proportion of relevant outcomes in the community, ensuring that the study accurately represented the population of interest.

Ethical approval for the study was obtained. The consent form entailed thorough information regarding objectives of the study, procedures, potential risks, and benefits. Participation was completely voluntary, and mothers were assured of the confidentiality and anonymity of information.

Stratified random sample technique was employed to ensure that the participating mothers were represented across various educational levels. The strata were divided into four categories according to the mother's highest stratum of formal education: no

formal education, basic education (up to the VIIIth grade), secondary education (grades IX through XII), and higher education (college degree or higher). Mother–child couples were chosen at random from each stratum to participate in the study, ensuring a balanced representation of educational backgrounds.

The inclusion criteria for the study required mothers to have children aged 2–5 years, have breastfed their children for at least 3 months, and be willing to participate and provide informed consent. Exclusion criteria included children with congenital oral or systemic conditions that could affect oral health outcomes, mothers with medical conditions that contraindicated breastfeeding, and mothers who had received formal education in dentistry or oral health-related fields.

Data collection involved two primary instruments. First, a finely structured questionnaire was developed to obtain data on maternal education, breastfeeding practices, and demographic information. The questionnaire included sections on socio-demographic data (age, income, occupation, etc.), maternal education status, duration and exclusivity of breastfeeding, and the introduction of complementary feeding.

Second, a standardized oral health examination was conducted on each child by a trained pediatric dentist. This examination assessed the presence of dental caries using the World Health Organization criteria for primary dentition, current status of oral hygiene using the Simplified Oral Hygiene Index (OHI-S), developmental dental anomalies, and occlusal characteristics, such as the presence of malocclusions.

Data were obtained in two phases. In the first phase, mothers were interviewed using the structured questionnaire. These interviews were conducted face-to-face by trained research assistants in a private setting within the clinic or healthcare center. In the second phase, each child underwent an oral health examination conducted using sterilized instruments under natural or adequate artificial lighting. The findings were recorded in a standardized oral health assessment form.

RESULTS

Demographic Characteristics of the Study Population

A total of 188 mother–child pairs participated in the study. The mean age of the mothers was 29.4 ± 5.2 years, and the mean age of the children was 3.6 ± 1.2 years. The distribution of maternal education levels was as follows: 16.5% of mothers had no formal education, 28.2% had primary education, 36.7% had secondary education, and 18.6% had higher education as seen in [Table 1](#).

Table 1: Demographic characteristics of the study population

Variable	n (%)
Maternal age (years)	
Mean \pm SD	29.4 \pm 5.2
Child's age (years)	
Mean \pm SD	3.6 \pm 1.2
Maternal education level	
No formal education	31 (16.5%)
Primary education	53 (28.2%)
Secondary education	69 (36.7%)
Higher education	35 (18.6%)

SD, standard deviation

Breastfeeding Duration by Maternal Education Level

The mean duration of breastfeeding varied significantly by maternal education level. Mothers with no formal education had a mean breastfeeding duration of 8.4 ± 2.6 months, while those with higher education had a mean duration of 11.8 ± 3.1 months. The difference in breastfeeding duration across different education levels was statistically significant ($F = 9.67, p < 0.001$) as seen in Table 2.

Oral Health Outcomes and Breastfeeding Duration

The prevalence of dental caries was found to be 32.4% among the children in the study. The mean OHI-S score was 1.76 ± 0.53 , indicating fair oral hygiene. Children breastfed for less than 6 months had a significantly higher mean OHI-S score (2.1 ± 0.6) compared with those breastfed for 6 months or more (1.5 ± 0.4), with a t -test value of 6.87 ($p < 0.001$) as seen in Table 3.

Furthermore, there was a significant association between prolonged breastfeeding (beyond 12 months) and the presence of malocclusions (Table 4). The Chi-square test indicated a significant association ($\chi^2 = 7.45, p = 0.006$).

The duration of breastfeeding and maternal educational attainment were found to be positively correlated in this study. In contrast to mothers with lesser levels of education, mothers with a higher level of education continued to breastfeed for longer.

Table 2: Mean duration of breastfeeding by maternal education level

Maternal education level	Mean duration (months) \pm SD	F-value	p-value
No formal education	8.4 ± 2.6	9.67	<0.001*
Primary education	9.3 ± 2.8		
Secondary education	10.7 ± 3.0		
Higher education	11.8 ± 3.1		

SD, standard deviation. *Statistically significant

Table 3: Association between breastfeeding duration and oral health parameters

Variable	<6 months (n = 56)	≥ 6 months (n = 132)	t-value	p-value
OHI-S (mean \pm SD)	2.1 ± 0.6	1.5 ± 0.4	6.87	<0.001*
Presence of dental caries	23 (41.1%)	38 (28.8%)	2.34	0.126 (NS)
Presence of malocclusions	15 (26.8%)	14 (10.6%)	7.45	0.006*

NS, non significant; SD, standard deviation. *Statistically significant

Table 4: Multiple linear regression analysis for predictors of breastfeeding duration and oral health outcomes

Variable	β -Coefficient	Standard error	t-value	p-value
Breastfeeding duration				
Maternal education level	0.42	0.09	4.67	<0.001*
Maternal age	0.15	0.05	2.94	0.004*
Oral hygiene status (OHI-S)				
Maternal education level	-0.31	0.10	-3.12	0.002*
Breastfeeding duration	-0.28	0.08	-3.50	<0.001*

*Statistically significant

Additionally, longer breastfeeding duration was associated with better oral hygiene outcomes in children, although prolonged breastfeeding was linked to an increased risk of malocclusions. These findings underscore the importance of maternal education in promoting optimal breastfeeding practices and favorable oral health outcomes in children.

These results highlight the need for targeted public health interventions that focus on breastfeeding education, particularly in populations with lower maternal education levels, to improve both breastfeeding duration and oral health outcomes in children.

DISCUSSION

This study sought to explore the link between maternal education status and breastfeeding duration, as well as its subsequent impact on various oral health parameters in children aged 2–5 years. The findings demonstrate that higher maternal education status is positively associated with longer breastfeeding duration and better oral health outcomes, particularly in terms of oral hygiene and reduced risk of dental caries. These results align with and contribute to the existing body of literature that emphasizes the crucial role of maternal education in shaping child health behaviors and outcomes.

Maternal Education and Breastfeeding Duration

The duration of breastfeeding was found to be positively correlated with the mother's educational attainment. Mothers with a higher education breastfed their children for a longer time duration than those with a lower level of educational achievement. This finding is consistent with other studies, such as those by Victora et al., who found that maternal education was a critical determinant of global breastfeeding patterns, with more educated women choosing to breastfeed for longer periods.⁶

The likely explanation for this trend is that educated mothers have better accessibility to information related to advantages of breastfeeding, greater health literacy, and a higher likelihood of receiving support from healthcare professionals.⁷ Moreover, educated mothers may also have a greater understanding of how to overcome common breastfeeding challenges, thus leading to prolonged breastfeeding durations.

Breastfeeding Duration and Oral Health-related Outcomes

The link between breastfeeding duration and oral health-related outcomes has been a subject of much debate. This study found that longer breastfeeding duration was associated with better oral hygiene, as indicated by lower OHI-S scores. This is consistent with the findings of Feldens et al., who reported that breastfeeding for 6 months or longer was associated with improved oral hygiene and reduced caries risk in preschool children.⁸ The rationale behind this could be that breastfeeding promotes the development of favorable oral bacterial flora, which plays a protective role against dental caries.⁹

However, the study also observed that prolonged breastfeeding, particularly beyond 12 months, was linked with elevated risk of malocclusions. This aligns with the findings of Peres et al., who suggested that extended breastfeeding might contribute to the development of dental malocclusions due to the continuous sucking habit and its impact on orofacial structures.¹⁰ Therefore, while breastfeeding has numerous health benefits, the potential risks associated with prolonged breastfeeding need to be

considered, and appropriate guidance should be provided to parents.

Comparison with Other Studies

The results of this study coincide with several other studies that explored the link between maternal education, breastfeeding practices, and oral health. For instance, Li et al. found that higher maternal education is linked to longer breastfeeding and improved oral health in children.¹¹ Additionally, Kramer et al. highlighted the role of maternal education in ensuring proper breastfeeding techniques, which in turn positively impacts oral health.¹²

On the contrary, a few studies have reported conflicting findings. A study conducted by Azevedo et al. revealed no significant correlation between maternal education and the incidence of dental caries in children. This suggests that other factors like oral hygiene and dietary habits might have a more substantial impact on the presence of tooth caries.¹³ This acknowledges the complexity of factors influencing oral health outcomes and the need for a multifaceted approach in public health interventions.

Limitations of Study

Several limitations of the study should be acknowledged to address the insufficiencies found in the present study.

First, due to the cross-sectional nature of the study, causal relationship among maternal education status, breastfeeding duration, and other oral health-related outcomes could not be established. The present study relied on self-reported data for breastfeeding duration and maternal education, which might impact the results of the study due to the influence of recall bias or social-desirability bias. Moreover, the data were obtained from a specific geographic region limiting the generalizability of the results.

Also, the study does not address any other confounding variables such as maternal nutrition, access to dental care, or genetic predispositions, which could influence both breastfeeding practices and oral health outcomes. Studies should consider a broader range of factors and utilize larger, more diverse sample populations to validate and extend these findings in future.

CONCLUSION

In conclusion, this study underscores the significance of maternal education in spreading awareness about longer breastfeeding sessions among lactating women and favorable oral health outcomes in children. The findings suggest that public health interventions aimed at improving breastfeeding practices and oral health education should particularly target mothers with lower educational attainment. These interventions could have significant implications in lowering the risk of occurrence of tooth-decay and malocclusion in children, thereby contributing to better long-term

health outcomes. However, the limitations of the study highlight the need for further research to explore these relationships more comprehensively and in diverse populations.

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