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Maternal parity and infant oral health: A cross-sectional study in India

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Abstract:
Maternal caregiving influences the establishment of infant oral health behaviours, but the influence of maternal parity on infant oral health awareness, perceptions, and preventive behaviours remains insufficiently explored. Hence, this hospital-based cross-sectional study assessed 329 mothers of infants aged ≤12 months attending a tertiary healthcare center in northern India using a structured interviewer-administered questionnaire, and outcomes were compared between primiparous (n=192) and multiparous (n=137) mothers using group comparisons and unadjusted binary logistic regression. Mean scores for infant oral health awareness, maternal perceptions, and preventive oral health behaviours did not differ significantly between primiparous and multiparous mothers (p=0.8836, p=0.2016, and p=0.5577, respectively), although multiparous mothers had significantly higher odds of optimal preventive oral health behaviours (OR=2.23; 95% CI: 1.01-4.92; p=0.0476), while parity was not associated with optimal awareness or positive perceptions. Thus, maternal parity may influence the implementation of preventive oral health behaviours more than awareness or perceptions, supporting the need for behaviour-focused infant oral health guidance, particularly for first-time mothers.

Keywords: Infant oral health, maternal parity, cross sectional studies

Background:
Infant oral health is a fundamental element of general child health and serves as the foundation of lifelong health. The first year of life is a critical period during which feeding practices, oral hygiene routines, and caregiver behaviors are established and these factors considerably influence future oral health outcomes **[1]**. The American Academy of Pediatric Dentistry (AAPD) recognizes that perinatal and infant oral healthcare provides the basis for preventive education, anticipatory guidance and early interventions aimed at reducing the burden of preventable oral diseases throughout life **[2]**. Early childhood caries (ECC) remains a major prevalent childhood oral health problem and is associated with pain, infection, impaired function, reduced quality of life and increased healthcare utilization **[3]**. The etiological factors responsible for ECC often originate during the initial stages; therefore caregiver-directed preventative strategies initiated during the first year of life are considered more effective than restorative interventions initiated after the disease onset **[4]**. Mothers are the primary caregivers during infancy and play a pivotal role in establishing behaviors that influence their children's oral health. Infant feeding practices, initiation of oral hygiene, dietary habits, healthcare utilization, and compliance with professional recommendations are primarily determined by maternal choice **[5]**. Previous studies have reported gaps in maternal awareness of recommended infant oral health practices and corresponding deficiencies in preventive behaviours **[6]**. Studies conducted among caregivers and mothers have similarly demonstrated that awareness, perceptions, and self-reported practices may not necessarily be aligned, indicating that the availability of health information alone may be insufficient to ensure its implementation in daily childcare **[7, 8]**. Maternal awareness and preventive oral health behaviors are influenced by several interrelated factors, including educational attainment, socioeconomic status, access to healthcare, cultural beliefs, and prior childcare experience **[9]**. Maternal parity defined as the number of previous childbirths may influence preventive caregiving through previous childcare experiences, although evidence regarding its relationship with infant oral health remains limited **[10]**. Baker *et al.* reported differences in infant oral health knowledge according to previous childbirth and the presence of children in the household among pregnant women **[11]**, whereas Kharouba *et al.* examined caries-prevention knowledge among breastfeeding mothers and identified maternal characteristics associated with awareness **[12]**. However, the existing evidence remains inconsistent, mostly focuses on maternal knowledge alone, and seldom evaluates preventive oral health behaviors among mothers of infants during the first year of life. India continues to experience a substantial burden of early childhood caries, and structured infant oral health promotion remains inadequately integrated into routine maternal and child health care services **[13]**. Tertiary healthcare institutions provide an ideal setting for anticipatory guidance because mothers frequently attend pediatric outpatient clinics for immunization, growth monitoring, and management of common childhood illnesses during infancy **[14]**. Understanding the influence of maternal parity on infant oral health awareness and preventive behaviors may facilitate the development of targeted educational approaches that address the specific needs of first-time mothers, while reinforcing preventive practices among experienced mothers **[15, 16]**. Therefore, it is of interest to evaluate the association between maternal parity and infant oral health awareness, maternal perceptions, and preventive oral health behaviours among mothers of infants attending a tertiary healthcare center in northern India.

Methodology:
Study design and setting:
This research employed a hospital-based cross-sectional design, conducted within the Department of Dentistry in collaboration with the Department of Pediatrics at our institution. The study

protocol received approval from the Institutional Ethics Committee of the University. Prior to enrolment, written informed consent was obtained from all participants, and the study adhered to the ethical principles outlined in the Declaration of Helsinki.

Study participants and sampling:
The study invited mothers of infants aged 12 months or younger, who visited the outpatient departments of Dentistry and Pediatrics during the study period, to participate. Mothers of apparently healthy infants who provided written informed consent were included. Mothers of infants with systemic illnesses, congenital anomalies, or syndromic conditions that could affect oral health, mothers of children aged >12 months, and those unwilling to participate were excluded The sample size was estimated using the single population proportion method, with assumptions of a 50% prevalence, a 95% confidence level, and a 5% margin of error. During the six-month study period, 329 eligible mothers were recruited using consecutive sampling, providing an estimated precision of approximately ±5.4% at the 95% confidence level.

Questionnaire and data collection:
Data were collected using a structured, pretested questionnaire developed following a review of relevant infant oral health literature. The questionnaire was reviewed for content relevance and clarity and translated into Hindi, followed by independent back-translation into English to maintain semantic equivalence. The questionnaire consisted of four sections designed to gather information on participants' sociodemographic characteristics, infant oral health awareness, maternal perceptions, and preventive oral health behaviors. Composite scores for each domain were calculated based on predefined scoring criteria. Eligible mothers were recruited continually during routine outpatient visits to the hospital. Trained investigators conducted face-to-face interviews after obtaining written informed consent from the participants. Participation was voluntary, and the confidentiality and anonymity of all the participants were maintained throughout the study.

Statistical analysis:
Data were entered into Microsoft Excel and analyzed using IBM SPSS Statistics version 25.0 (IBM Corp., Armonk, NY, USA). Continuous domain scores were summarized as mean ± standard deviation (SD), while categorical variables were presented as frequencies and percentages. Mean infant oral health awareness, maternal perception, and preventive oral health behaviour scores were compared between primiparous and multiparous mothers using the independent-samples t-test. Binary logistic regression was performed to examine the association between maternal parity and dichotomized study outcomes, and unadjusted odds ratios (ORs) with 95% confidence intervals (CIs) were calculated. A two-sided p-value <0.05 was considered statistically significant

Results:

A total of 329 mothers of infants participated in the study, consisting of 192 (58.4%) primiparous and 137 (41.6%) multiparous women. Mean infant oral health awareness scores were similar between primiparous and multiparous mothers (4.31±1.80 and 4.34±1.69, respectively; p= 0.8836). Similarly, no significant differences were observed in mean maternal perception scores (18.70±1.96 vs. 18.98±1.95; p=0.2016) or mean preventive oral health behaviour scores (2.46 ± 0.89 vs. 2.40 ± 0.85; p=0.5577) (**Table 1**). Binary logistic regression showed no significant association between maternal parity and positive maternal perceptions (OR=0.66; 95% CI: 0.38-1.14; p=0.1318). The association between parity and optimal infant oral health awareness could not be reliably estimated because only one participant achieved the optimal awareness outcome. Multiparous mothers had significantly higher odds of demonstrating optimal preventive oral health behaviours than primiparous mothers (OR=2.23; 95% CI: 1.01-4.92; p=0.0476). The group comparisons are presented in **Table 1**, and the logistic regression findings are presented in **Table 2**.

Table 1: Comparison of infant oral health awareness, maternal perceptions, and preventive oral health behaviours according to maternal parity (n=329)

Study outcome	Primiparous (n=192) Mean ± SD	Multiparous (n=137) Mean ± SD	P-value
Infant oral health awareness	4.31 ± 1.80	4.34 ± 1.69	0.8836
Maternal perceptions	18.70 ± 1.96	18.98 ± 1.95	0.2016
Preventive oral health behaviours	2.46 ± 0.89	2.40 ± 0.85	0.5577

Independent-samples t-test; SD- standard deviation

Table 2: Binary logistic regression analysis of the association between maternal parity and infant oral health outcomes

Outcome	Odds Ratio (95% C I)	P-value
Optimal infant oral health awareness#	NE	NE
Positive maternal perception	0.66 (0.38-1.14)	0.1318
Optimal preventive oral health behaviours	2.23 (1.01-4.92)	**0.0476***

*NE-Not-estimable; CI-confidence interval *Significant #only one participant achieved the optimal awareness outcome, resulting in sparse outcome events and an unstable odds ratio estimate*

Discussion:
The present study encompasses current evidence by examining maternal parity in relation to three distinct dimensions of infant oral health awareness, perceptions, and preventive behaviours among mothers of infants during the first year of life. While previous studies have primarily examined maternal oral health knowledge or broader caregiver characteristics **[6, 7]**, our findings suggest that parity may be related to the implementation of preventive behaviours even when overall awareness and perceptions are comparable between primiparous and multiparous mothers. This distinction provides a more specific understanding of how previous parenting experience may relate to infant oral health behaviour. This study notably identifies no significant association between maternal parity and awareness of infant oral health. Although multiparous mothers have prior childcare experience, parity alone was not associated with improved awareness in the present study. Awareness is more likely influenced by access to reliable health information, effective communication from

healthcare experts, and opportunities for oral health education rather than previous parenting experience. Studies among mothers and caregivers have reported important gaps in infant and child oral health awareness and preventive practices **[17, 18]**. Our findings partly differ from those of Baker *et al.*, who reported modest variances in infant oral health knowledge among pregnant women based to parity **[11]**. However, their study population consisted of pregnant women rather than mothers of infants, and the observed differences diminished after accounting for maternal characteristics. Differences in study design, cultural context, healthcare delivery systems, and assessment tools may explain these discrepancies. Importantly, our results suggest that previous childbirth does not automatically translate to improved awareness during infancy, highlighting the continual need for structured oral health education; regardless of maternal parity. Maternal perception scores were also comparable between parity groups. Both groups exhibited positive perceptions, suggesting that mothers recognized the importance of maintaining their infants' oral health. However, these perceptions did not translate into equivalent preventive oral health behaviors, suggesting that positive perceptions alone are insufficient to induce behavioral change. Previous studies have shown that parental beliefs and attitudes may not consistently correspond with the adoption of recommended oral health practices **[19, 20 and 21]**. This outcome emphasizes the concept that awareness, perceptions, and behaviors are distinct yet interrelated components of health promotion. The principal finding was the higher odds of optimal preventive oral health behaviours among multiparous mothers. Multiparous mothers had more than twice the odds of demonstrating the predefined optimal behaviour outcome compared with primiparous mothers. This association should nevertheless be interpreted cautiously because the mean preventive behaviour scores did not differ significantly between groups, and the confidence interval was close to the null value. The difference between the two analyses reflects the different outcomes examined: **Table 1** compared average scores, whereas logistic regression evaluated the odds of achieving the predefined optimal category. Previous caregiving experience may therefore be associated with the adoption of specific preventive behaviours even when overall awareness and perception scores are similar. The identified disparity between awareness and preventive oral health behaviors carries substantial implications for infant oral health promotion. Educational approaches directed solely toward increasing awareness may be insufficient to improve routine preventive behaviours. Supporting this concept, Yang *et al.* reported that prenatal oral rehabilitation was associated with sustained improvements in maternal oral-health literacy and increased dental care utilization, with 40% of infants receiving a dental visit before 1 year of age **[22]**. These findings suggest that effective oral health promotion should combine information with practical, behaviour-oriented guidance and facilitated access to preventive dental care. Since awareness and perceptions were comparable regardless of maternal parity, it is recommended that infant oral health education should be incorporated into routine maternal and child healthcare services for all mothers. Evidence that structured prenatal oral-health interventions can improve maternal oral-health literacy and subsequent dental-care utilization further supports integrating practical oral-health guidance into routine maternal and infant healthcare contacts **[22]**. Antenatal clinics, immunization sessions, well-baby clinics, and pediatric outpatient services provide valuable opportunities to incorporate anticipatory oral health guidance during infancy. Furthermore, interdisciplinary collaboration among pediatricians, dentists, nurses, and primary healthcare providers could strengthen early preventive interventions and help reduce the incidence of caries. The present study had several strengths. It focused specifically on mothers of infants within the first year of life, a period acknowledged as crucial for the development of lifelong oral health behaviors. The study advances existing evidence by examining awareness, perceptions, and preventive oral health behaviours together and by specifically evaluating their relationship with maternal parity among mothers of infants. Nevertheless, this study possesses certain limitations. The cross-sectional design restricts the ability to infer causality between maternal parity and preventive oral health behaviors. The regression analyses were unadjusted, and therefore the observed association between parity and preventive behaviours may be influenced by other maternal or sociodemographic factors. The study was conducted at a single tertiary healthcare center, which may limit generalizability. In addition, preventive behaviours were self-reported and may have been affected by recall or social desirability bias. Finally, sparse outcome events prevented reliable estimation of the association between maternal parity and optimal infant oral health awareness. Overall, maternal parity was not associated with differences in mean infant oral health awareness or maternal perception scores, but multiparity was associated with higher odds of achieving the predefined optimal preventive behaviour outcome. Future longitudinal and interventional studies should explore whether incorporating structured infant oral health education into antenatal and pediatric healthcare services can enhance preventive oral health behaviors, especially among first-time mothers, and ultimately reduce the burden of early childhood caries in the future.

Conclusion:

Maternal parity was not associated with differences in mean infant oral health awareness or maternal perceptions. Multiparous mothers had higher odds of showing optimal preventive oral health behaviours than primiparous mothers. Behaviour focused oral health guidance should be integrated into routine maternal and child healthcare, particularly for first-time mothers.

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