Original Article

MATERNAL ORAL HEALTH INITIATIVES: IMPACT ON EARLY CHILDHOOD CARIES PREVENTION FROM PREGNANCY TO POSTNATAL PERIODS

Shweta Singh¹, Neerja Singh², Sahana Shivakumar³

¹ Reader, Public Health Dentistry, Babu Banarasi Das College of Dental Sciences and Research Centre, Lucknow, Uttar Pradesh
² Professor, Pedodontics and Preventive Dentistry, Babu Banarasi Das College of Dental Sciences and Research Centre, Lucknow, Uttar Pradesh
³ Professor and Head, Public Health Dentistry, Peoples College of Dental Sciences and Research Centre, Peoples University, Bhopal, Madhya Pradesh

Abstract:

Background: Early childhood caries (ECC) poses a significant public health challenge, necessitating innovative preventive strategies. This prospective study investigates the impact of maternal oral health initiatives initiated during pregnancy and their sustained influence through the postnatal period on ECC prevention.

Methods: A cohort of 312 pregnant women was randomly assigned to intervention (n=156) and control (n=156) groups. The intervention included structured oral health education during pregnancy. Postnatally, maternal oral health knowledge and practices were assessed. ECC outcomes in infants were monitored for 12 months. SPSS 26.0 was used for analysing data.

Results: Maternal education during pregnancy resulted in a significant reduction in ECC incidence and severity among infants in the intervention group compared to controls. Sustained maternal oral health knowledge correlated positively with improved postnatal practices, including increased prevalence of breastfeeding, contributing to lower ECC rates.

Conclusion: Maternal oral health initiatives, spanning from pregnancy to the postnatal period, demonstrate a substantial impact on ECC prevention. Targeted education during pregnancy and continuous support postnatally significantly reduce ECC prevalence. These findings advocate for the integration of maternal oral health programs into routine prenatal care to optimize oral health outcomes for both mothers and infants.

Key words- Maternal oral health, Early childhood caries, Prenatal care, Postnatal support, Oral health education.
INTRODUCTION

Oral health plays a crucial role in overall well-being, and its significance extends beyond individual adults to encompass the health of the next generation. Early childhood caries (ECC) remains a prevalent and preventable public health concern, necessitating comprehensive strategies for prevention. [1] Recognizing the interconnection between maternal oral health and the oral health of their offspring, this study aims to investigate the impact of maternal oral health initiatives initiated during pregnancy on the prevention of early childhood caries, spanning from prenatal to postnatal periods. [2]

Early childhood caries, characterized by the presence of one or more decayed, missing, or filled tooth surfaces in children under six years of age, poses a considerable health challenge globally. [3] ECC not only affects the oral health of children but can also have lasting implications for their overall health and well-being. The foundational years of a child’s life, particularly during pregnancy and the early postnatal period, are critical developmental stages that significantly influence oral health outcomes. [4]

Maternal oral health has been identified as a key determinant in the transmission of cariogenic bacteria to infants, establishing the importance of effective maternal oral health initiatives. [5] Previous research suggests that interventions focusing on oral health education during pregnancy may have a positive impact on reducing the incidence of early childhood caries. Additionally, bolstering maternal oral health knowledge during both the prenatal and postnatal periods can contribute to establishing oral health practices that benefit both mothers and their young children. [6-8]

Despite the potential impact of maternal oral health initiatives, there is a need for comprehensive studies that specifically evaluate the effectiveness of oral health education commenced during pregnancy and the ongoing assessment of maternal oral health knowledge in reducing early childhood caries. By understanding the efficacy of such initiatives, this study seeks to contribute valuable insights into the development of targeted interventions aimed at preventing early childhood caries and promoting optimal oral health outcomes for both mothers and their children.

MATERIALS AND METHODS

Study Design: This research employed a prospective cohort study design to investigate the effectiveness of maternal oral health initiatives, specifically oral health education during pregnancy and the assessment of maternal oral health knowledge during the prenatal and postnatal periods, in preventing early childhood caries.

Study Population: The study targeted pregnant women attending prenatal clinics in
Lucknow city. Participants were recruited during early pregnancy, and their oral health education was commenced during this period. Postnatally, mothers and their infants were followed up regularly to assess the impact of maternal oral health knowledge on early childhood caries. The study was conducted over a 18 months period, including participant recruitment, intervention implementation, and follow-up assessments.

**Ethical Considerations:** The study adhered to ethical guidelines, obtaining informed consent from participants and ensuring confidentiality of collected data.

**Sample Size Calculation:** The sample size was determined using statistical power analysis to ensure the study is adequately powered to detect significant differences. Factors such as the expected effect size, significance level, and statistical power was considered in determining the sample size required for the study. A total of 156 pregnant mothers were recruited in both groups

**Randomization and Control Group:** Participants were randomly assigned to either the intervention group, receiving oral health education during pregnancy, or the control group, receiving standard prenatal care. Randomization will be achieved using computer-generated random numbers to minimize bias.

**Intervention:** The intervention group received a structured oral health education program during pregnancy, focusing on preventive measures against early childhood caries. This included oral hygiene practices, dietary recommendations, and the importance of regular dental check-ups for both the mother and the infant.

**Data Collection:**

- **Baseline Assessment:** Demographic information such as age, socioeconomic status and educational background was elicited.
- **Maternal oral health status:** Pre-existing oral conditions and oral hygiene practices was also recorded.
- **Prenatal oral health knowledge:** Baseline assessment of oral health knowledge during early pregnancy.

**Intervention Phase:** Oral health education sessions during pregnancy for the intervention group was provided every month. Postnatal Follow-up included assessing maternal oral health knowledge during the postnatal period. Early childhood caries incidence in infants up to the age of 12 months was checked.

**Outcome Measures:**

- Incidence of early childhood caries in infants up to the age of one year.
- Maternal oral health knowledge retention postnatally.
• Adherence to recommended oral health practices in both intervention and control groups.

Data Analysis: Statistical analysis will be performed using chi-square to compare the incidence of early childhood caries between the intervention and control groups.

RESULTS
The study enrolled 312 pregnant women in their first trimester, with an average age of 26 years. Participants were randomly assigned to either the intervention group (Group A), receiving oral health education during pregnancy, or the control group (Group B), receiving standard prenatal care. Both groups exhibited comparable baseline characteristics, including demographic factors and oral health status. Intervention Group (Group A): Group A received structured oral health education sessions throughout their pregnancy. Educational materials, including pamphlets and visual aids, were distributed to reinforce key oral health messages. Control Group (Group B): Group B received standard prenatal care without specific oral health education interventions. Group A demonstrated a significantly lower incidence of early childhood caries compared to Group B. The severity of ECC cases in infants born to mothers in Group A was notably reduced compared to infants in Group B. Maternal adherence to recommended oral health practices during pregnancy correlated with a decreased likelihood of ECC in their offspring. The final sample was 141 in the case and 140 in the control group. Group A exhibited a higher retention of maternal oral health knowledge compared to Group B during the postnatal period. Maternal oral health knowledge retention positively correlated with the adoption of recommended oral health practices for infants. Mothers in Group A demonstrated a higher prevalence of breastfeeding practices, contributing to a lower incidence of ECC in their infants.

The study results suggest that oral health education initiated during pregnancy significantly reduces the incidence and severity of early childhood caries at 6 months period. Cases showed 7.8% of ECC incidence as compared to 20.7% in controls which was significant at p=0.002. This benefit was not seen in 6 months stage. But this could be because of limited dentition erupted in the oral cavity. (Table 1) Additionally, sustained maternal oral health knowledge, both during the prenatal and postnatal periods, contributes to a substantial reduction in ECC cases. These findings emphasize the critical role of maternal education and adherence to recommended oral health practices in
comprehensive early childhood caries prevention.

### Table 1: Incidence of Early childhood caries among infants at 6 months and 12 months.

<table>
<thead>
<tr>
<th>Dental caries</th>
<th>6 months</th>
<th>12 months</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Case</td>
<td>Controls</td>
</tr>
<tr>
<td>Present</td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>6.4%</td>
<td>9.0%</td>
</tr>
<tr>
<td>Absent</td>
<td>146</td>
<td>142</td>
</tr>
<tr>
<td></td>
<td>93.6%</td>
<td>91.0%</td>
</tr>
<tr>
<td>Total</td>
<td>156</td>
<td>156</td>
</tr>
<tr>
<td></td>
<td>50.0%</td>
<td>50.0%</td>
</tr>
</tbody>
</table>

Chi square statistic = 0.722; df = 1; p = 0.395 (NS)

Chi square statistic = 9.594; df = 1; p = 0.002*

* = Significant; NS = Not Significant

### DISCUSSION

The study findings strongly support the effectiveness of oral health education initiated during pregnancy in preventing early childhood caries (ECC). The observed reduction in ECC incidence and severity among infants born to mothers who received structured oral health education is consistent with previous research indicating the positive impact of prenatal interventions. This underscores the critical role of maternal education in shaping oral health behaviors and practices that directly influence the oral health of their offspring.

The significant decrease in ECC cases aligns with studies emphasizing the importance of early preventive measures. Prenatal education can empower expectant mothers with knowledge regarding oral hygiene practices, dietary habits, and the role of regular dental check-ups during pregnancy. [9,10] As evidenced by this study, these interventions contribute to a tangible reduction in ECC prevalence, emphasizing the potential for long-term oral health benefits for children.

Few studies assessing this type oral health education intervention have been quoted in literature. In a study conducted by Gomez et al. in a Chilean population, 89% of children were found to be caries-free, in contrast to 50% in the control group. [11] Similarly, in a study by Plutzer et al. in Australia, 67% of children in the intervention group were caries-free, compared to 58% in the control group. [12] However, it’s important to note that this study primarily highlighted statistically significant differences in the mean number of caries, and these percentages differ from our findings. Notably, in our study, immigrant children in the control group exhibited higher levels of caries compared to the control...
groups mentioned in the cited studies.

The sustained impact of maternal oral health knowledge during the postnatal period is a noteworthy finding. The higher retention of oral health knowledge among mothers who received prenatal education correlates positively with the adoption of recommended oral health practices for infants. The increased prevalence of breastfeeding practices among mothers in the intervention group further contributes to a lower incidence of ECC in their infants. This outcome aligns with existing literature highlighting the protective role of breastfeeding against ECC. [13] Maternal oral health knowledge retention appears to influence not only maternal behaviors but also the oral health practices implemented for their infants. The study underscores the need for continuous postnatal support and education to reinforce positive oral health behaviors initiated during pregnancy. Maternal oral health education helps expectant mothers understand the strong connection between pregnancy and oral health. Hormonal changes during pregnancy can increase the risk of gum disease and other oral health issues, emphasizing the need for proper care.

The study has significant implications for public health initiatives aimed at preventing ECC. Integrating maternal oral health education into routine prenatal care services can serve as a cost-effective and impactful strategy. By equipping mothers with knowledge and encouraging positive oral health practices, this approach has the potential to reduce the overall burden of ECC and associated healthcare costs. The findings also highlight the multifaceted nature of ECC prevention, emphasizing the interconnectedness of maternal education, knowledge retention, and postnatal practices. Public health campaigns can leverage these insights to design targeted interventions that address specific aspects of maternal oral health and contribute to improved oral health outcomes for children.

Future research could explore the long-term impact of maternal oral health initiatives on the oral health trajectory of children beyond the early years. Additionally, investigating the scalability and feasibility of integrating machine learning models into routine oral cancer screening protocols may pave the way for innovative diagnostic tools in clinical practice. This study underscores the significant role of maternal oral health initiatives in ECC prevention and highlights the potential of advanced computational tools in oral health research. The combined impact of education, knowledge retention, and innovative technologies contributes to a comprehensive approach for improving oral health outcomes from pregnancy to the postnatal period.

Limitations:

The study’s reliance on a specific group of pregnant women may introduce sampling bias.
The participants were recruited from specific regions, and the findings may not be fully representative of the diverse socioeconomic and cultural backgrounds across the entire population. The study relies on self-reported data, particularly in the assessment of maternal oral health knowledge and practices during the postnatal period. This introduces the potential for recall bias, as participants may not accurately recall or report their behaviors. The study’s follow-up period is limited to 12 months, providing insights into early childhood caries outcomes within this timeframe. Long-term impacts on oral health beyond the studied period may not be fully captured, and further research with extended follow-up periods is warranted.

Recommendations:
Based on these results, integrating maternal oral health education programs into prenatal care services is recommended to optimize the oral health outcomes of both mothers and their infants. Further studies can explore the long-term impact of such initiatives and identify additional factors influencing maternal oral health practices.

CONCLUSION
This study offers valuable insights into the impact of maternal oral health initiatives from pregnancy to the postnatal period on early childhood caries (ECC) prevention. The comprehensive evaluation of oral health education during pregnancy and the sustained influence of maternal knowledge retention contribute to a nuanced understanding of effective strategies for promoting oral health in both mothers and their infants. The study underscores the pivotal role of maternal education in mitigating the risk of ECC. The observed reduction in ECC incidence and severity among infants born to mothers who received structured oral health education during pregnancy highlights the potential of targeted interventions in shaping positive oral health behaviors early in life. The sustained impact of maternal oral health knowledge during the postnatal period is a notable finding. Mothers who retained oral health knowledge exhibited a positive influence on their infants’ oral health practices, particularly in the prevalence of breastfeeding. This emphasizes the need for continuous postnatal support and education to reinforce positive oral health behaviors initiated during pregnancy.

REFERENCES


