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MAAC CHART: A SIMPLE NOVEL TOOL FOR EARLY DETECTION OF EARLY CHILDHOOD CARIES

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ABSTRACT

Background: Despite advances in dentistry, oral health remains neglected globally, with nearly 530 million children affected by untreated dental caries. Early Childhood Caries (ECC) is a major public health burden, especially in the primary dentition where caries progresses rapidly. Early diagnosis and timely intervention are essential to prevent disease progression and related complications. **Aim**: To educate parents, pediatricians, primary health-care workers, and caregivers about ECC and promote early detection and prevention using the MAAC chart. **Study Design And Setting**: A cross-sectional educational intervention study was conducted in the Department of Pedodontics and Preventive Dentistry, People's Dental Academy, Bhopal, Madhya Pradesh, after obtaining ethical approval. The study period was eight months (February–October 2025). **Methods And Material**: A total of 748 children were screened, of whom 281 were diagnosed with ECC. Parents and caregivers were educated using the MAAC chart regarding ECC prevalence, available treatment options, and preventive measures through a structured survey. **Statistical Analysis**: Data were coded and analyzed using SPSS version 30.0. **Results**: After the intervention, 60.1% of parents showed willingness to seek dental treatment for their children, indicating a positive behavioral change. **Conclusion**: Caregivers demonstrated limited knowledge and practices regarding preschool oral health. The MAAC chart proved to be an effective educational tool, highlighting the need for structured oral health promotion programs to bridge existing knowledge gaps.

KEYWORDS: Early diagnosis of ECC is made with MAAC chart.

INTRODUCTION

Oral diseases impact approximately 3.5 billion people worldwide. An estimated 530 million children are affected by untreated dental caries.[1] This condition represents a major public health concern, as its consequences are multidimensional, exerting adverse effects not only on oral health but also on overall systemic well-being.[1]

Early childhood caries (ECC) is classified as mild, moderate, or severe.[2] The World Health Organisation (WHO) published the Implementation Manual *"Ending Childhood Dental Caries"* in 2019 to guide a wide range of stakeholders.[3] The manual emphasizes the importance of early diagnosis in the prevention and management of ECC and advocates for the integration of oral healthcare into broader, mainstream health initiatives.[4]

The prevalence of oral diseases is notably higher in developing countries, including India, due to limited access to treatment, insufficient primary oral healthcare services, rapid urbanization, and inadequate exposure to preventive interventions, such as fluoride therapy.[5] Children spend the majority of their time with their caregivers, particularly mothers, the oral health practices and behaviours of these primary caregivers have a significant influence on the child's oral health outcomes.[6]

Risk factors for early childhood caries (ECC) include nocturnal bottle-feeding, a sugar-rich diet, limited parental knowledge regarding oral health, low socioeconomic status, and restricted access to dental care services.[7] Early diagnosis is critical for the prevention of early childhood caries (ECC), as caries progress rapidly in the primary dentition. Timely intervention can prevent or even reverse the associated complications.[8] It has been estimated that up to 98% of cavities could be prevented if dental examination occurs promptly following the eruption of the first tooth.[9] Systematic reviews on ECC prevention and management have emphasized that early initiation of care, combined with sustained preventive interventions, represents the most effective strategy for controlling the disease.[10] Introduction of a simple diagnostic tool called the MAAC chart for all stakeholders as a self-reporting or early diagnostic tool to identify the earliest changes on the enamel surface was done.[10] The MAAC chart is based on three important pillars: 'early diagnosis,' 'self-reporting,' and 'early prevention.[3]

The rationale for the MAAC chart

1. Promote awareness and interest among parents and caregivers with a pictorial chart revealing the earliest changes of the enamel and the stages of breakdown.
2. It should be a simple tool fitting into large healthcare campaigns involving all stakeholders to promote the immediate diagnosis of early lesions and report to the respective healthcare facility for further preventive efforts.

METHOD

STUDY DESIGN AND SETTING

A descriptive cross-sectional study was conducted in the Outpatient Department of Pedodontics and Preventive Dentistry at People's Dental Academy, Bhopal, Madhya Pradesh. Ethical clearance was obtained from the Research and Ethical Committee of People's University. The study was carried out over an eight-month period, from February 2025 to October 2025. Prior written informed consent was obtained from all parents who voluntarily agreed to participate.

INCLUSION CRITERIA

Children aged 2 to 5 years diagnosed with Early Childhood Caries (ECC) and their parents were included in the study.

EXCLUSION CRITERIA

Children above 5 years of age, those without ECC, and parents of children without ECC were excluded. Parents who were unable to read and write, those who were not the primary caregivers, and children with associated systemic medical conditions were also excluded to ensure data reliability and accurate understanding of the questionnaire.

SAMPLING TECHNIQUE AND SAMPLE SIZE

748 children were checked of which 281 children were diagnosed with ECC. After explaining parents, caretakers, stakeholders and paediatrician about ECC prevalence with help of MAAC chart, treatment option available for treatment of dental caries, measures taken to prevent ECC and survey questions were given from which it was concluded that 169 children parent were ready for treatment and 112 children parents were not ready for treatment.

RESULT

Table 1: Distribution of Parental Responses on Knowledge and Practices Related to Early Childhood Caries (n = 281)

S. No.	Question	Yes n (%)	No n (%)
Feeding and Oral Hygiene Practices			
1	Does your child drink milk from a bottle?	271 (96.4%)	10 (3.6%)
2	Does your child brush twice daily?	42 (15%)	239 (85%)
3	Does your child sleep while drinking milk?	280 (99.6%)	1 (0.4%)
4	Does your child take a nutritious diet?	197(70%)	84 (30%)
Parental Awareness and Attitude toward Early Childhood Caries (ECC)			
5	Does your child have tooth decay (dental caries)?	281 (100%)	0 (0%)
6	If you noticed black discoloration on your child's teeth, did you take your child to the dentist?	280 (99.6%)	1 (0.4%)
7	Do you know that a child should be taken for a dental	0 (0%)	281

	check-up every 6 months?		**(100%)**
8	**Were you aware of the treatment options available for Early Childhood Caries (ECC)?**	**1 (0.4%)**	**280 (99.6%)**
Parental Willingness to Seek Treatment after Awareness Intervention			
9	**After listening to the information provided by us about ECC, are you willing to get treatment for your child?**	**169 (60.1%)**	**112 (39.9%)**

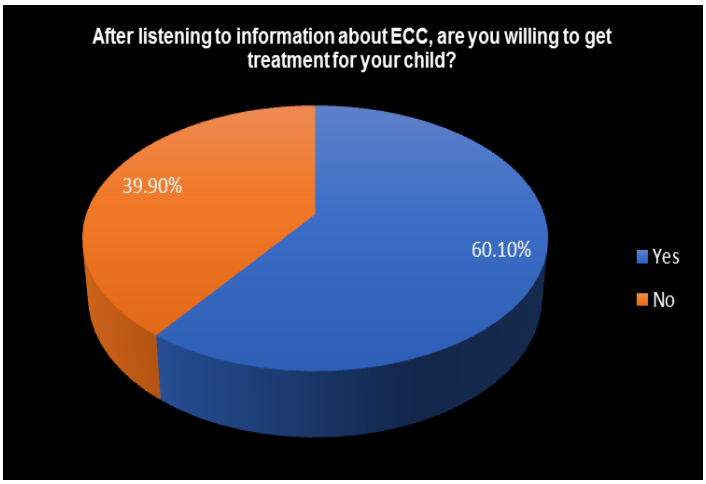

Figure 1: Parental Willingness to Seek Treatment for Early Childhood Caries (ECC) after Awareness Intervention.

Overall, the findings highlight high-risk feeding behaviors, poor oral hygiene practices, and low parental awareness, emphasizing the need for targeted parental education and community-based preventive programs to reduce the burden of Early Childhood Caries.

STATISTICAL ANALYSIS

The collected data were coded and entered into the Statistical Package for the Social Sciences (SPSS) software, version 30.0 (IBM Corp., Armonk, NY, USA) for analysis. Descriptive statistics such as frequency (n) and percentage (%) were computed to summarize categorical variables including feeding practices, oral hygiene behaviors, and parental awareness and attitudes toward Early Childhood Caries (ECC). Results were presented in the form of frequency distribution tables and bar charts for better visualization and interpretation of parental responses.

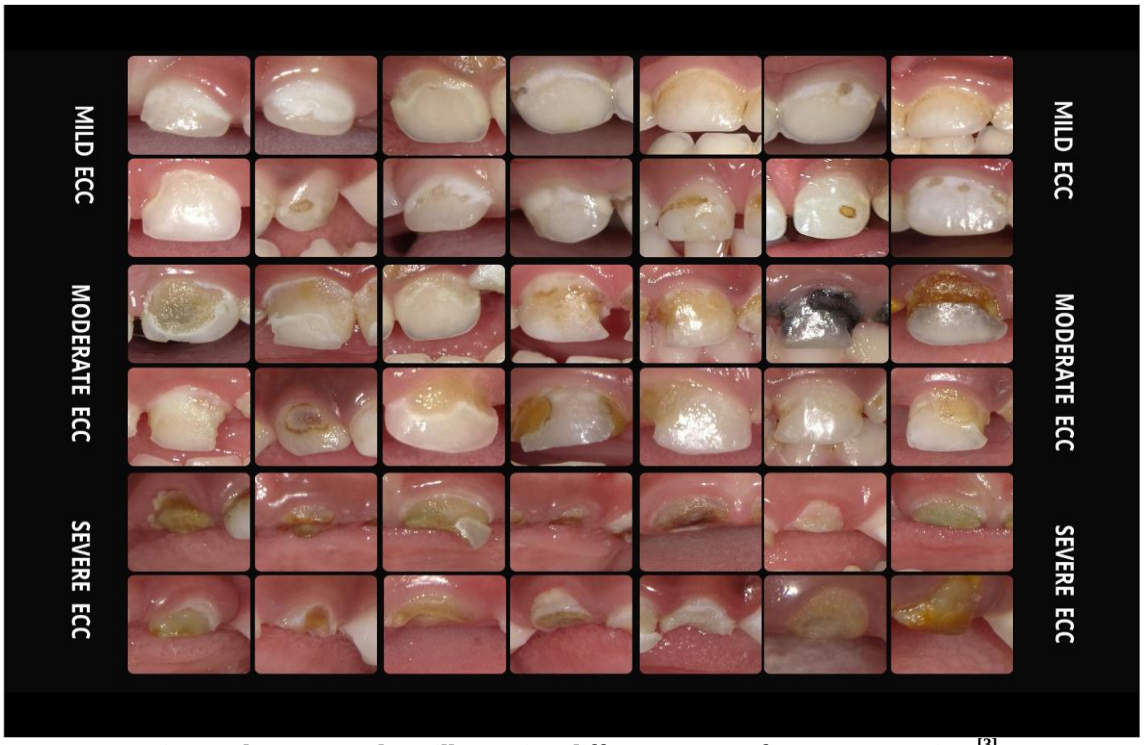

Fig. 2: The MAAC chart illustrating different stages of ECC progression.[3]

DISCUSSION

Parents play a pivotal role in shaping their children's health behaviours, as children tend to acquire habits through observation and imitation. Consequently, inculcating proper oral hygiene practices in children is most effective when parents themselves consistently follow these practices. Dental caries is a largely preventable disease, and early detection not only improves children's cooperation during treatment but also helps parents reduce the time and financial burden associated with repeated dental visits, including loss of work hours. Therefore, prevention at the primordial level, along with comprehensive oral health education for parents, is of paramount importance, particularly because preschool children (2–4 years of age) are entirely dependent on caregivers for their oral health needs in our study, this approach helped to improve the oral health of children.[11]

Parents of children using feeding bottles were advised to avoid placing sweetened liquids, including fruit juices, in the bottle. Furthermore, unrestricted breastfeeding was discouraged, and caregivers were instructed not to allow children to sleep or nap while being bottle-fed or breast-fed, as these practices significantly increase the risk of early childhood caries.[12]

Awareness and understanding of oral health conditions are fundamental to the prevention of dental diseases such as dental caries. Inadequate oral health literacy often leads to poor interpretation of self-care instructions, inappropriate oral hygiene practices, and underutilization of dental services. Enhancing parental knowledge is therefore essential to improve self-care behaviours and to reduce the overall burden of oral diseases in the community. Although organisations such as the American Academy of Pediatric Dentistry (AAPD), the American Academy of Pediatrics (AAP), and the American Dental Association (ADA) strongly advocate an early dental visit to promote infant oral health and prevent early childhood caries, successful implementation requires active collaboration with allied health professionals and pediatricians. Greater integration between the dental and medical communities is necessary to effectively prevent oral health of children.[13]

The AAPD recommends that a child's first dental visit should always occur at the time of eruption of the first primary tooth and no later than 12 months of age.[14] Similarly, the AAP advocates the establishment of a dental home by one year of age, particularly for children at high risk for dental caries.[15] In contrast to the findings of the our study, Balamurugan and Sahana[16] and Lone et al.[17] reported that approximately 65.3% of parents believed regular dental visits were unnecessary and that dental care was required only when the child experienced pain. Our study showed 60.10% parents agreed for there child treatment by understanding the importance of primary teeth, need of treating ECC even without pain.

Several studies assessing parental capacity to manage their children's oral health have identified barriers such as lack of time, insufficient knowledge of appropriate brushing techniques, occupational stress, and changing family structures.[18] In contrast to this in the present study, parents were actively seeking treatment for their child. The increasing prevalence of nuclear families and working parents has resulted in greater reliance on daycare centres and crèches, further limiting parental involvement in daily oral health care routines.[18]

CONCLUSION

The present study indicates inadequate knowledge and awareness among parents, paediatrician, and caregivers regarding the ECC of children and preventive therapies available to prevent the incidence of dental caries among preschoolers. The study revealed that caregivers and parents had very little knowledge and clinical practice concern with the oral well-being of preschool kids. The study's results reveal that promotion programs in relation to ECC have helped to bring awareness are required to cover the gaps of knowledge among parents, paediatrician and caretakers of kids related to the care of dental caries in their young kids.

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