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Original Research (Survey)

Save Six: Parent and Child Awareness on Eruption Patterns and Dental Caries Risk in the Mixed Dentition Phase

Running title: Parental Awareness of Mixed Dentition and Caries Risk

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ABSTRACT

Context: The mixed dentition phase (6–12 years) is crucial as primary teeth are replaced by permanent ones, increasing caries risk. Parental awareness of eruption patterns is vital for early prevention and care.

Aims: To assess parental knowledge of normal tooth eruption sequences, the crucial importance of the first permanent molars and understanding the risk of dental caries during the mixed dentition stage.

Methods: A structured cross-sectional survey was conducted among parents of children aged 6–12 years to assess knowledge of tooth eruption, abnormalities, caries risk, and oral hygiene. Data were analyzed using descriptive and inferential statistics.

Statistical analysis: Data were analyzed using descriptive and inferential statistics.

Results: A total of 102 parents participated in the survey on awareness of the mixed dentition period and first permanent molars. Most parents (70.6%) had poor knowledge, while only 12.7% showed good understanding. Awareness was low—just 6.9% recognized first molars, and 36.3% believed they would shed like primary teeth. Nearly half (48%) were unfamiliar with the mixed dentition period, and 41.2% were unaware of the need for early dental visits. Only 13.7% recognized the caries risk, reflecting overall limited parental awareness.

Conclusions: The study reveals poor parental awareness and misconceptions about the mixed dentition period and first permanent molars. Targeted educational programs are needed to improve early recognition and care for better oral health outcomes.

Key-words: Parental awareness, tooth eruption patterns, dental caries risk, mixed dentition, First permanent molars FPM's, child dental care, pediatric oral health.

INTRODUCTION

The mixed dentition period, typically occurring between 6–12 years of age, represents a crucial phase in a child's dental development when both primary and permanent teeth coexist. [1] This transitional stage is significant for monitoring tooth eruption, arch space, and occlusal development, which influence long-term oral health.[2] Proper guidance during this phase aids in the prevention of malocclusion, early detection of caries, and preservation of leeway space, ensuring a balanced and functional dentition essential for future orthodontic stability. [3] The first permanent molar, often erupting around six years of age, serves as a cornerstone in establishing occlusion and facial growth patterns.[3] Despite its critical role, parents frequently misidentify it as a deciduous tooth, leading to neglect and increased caries risk.[4] This tooth maintains arch

integrity, supports vertical dimension, and guides the eruption of adjacent teeth.[5] Early parental recognition and preventive care of the first molar are essential to ensure long-term oral health and proper occlusal development.

Parental awareness during the mixed dentition period is crucial for maintaining oral health and preventing early dental problems.[6] Educating parents about eruption sequences and the significance of permanent teeth encourages timely dental visits and preventive care.[7] Awareness initiatives can effectively reduce caries incidence and promote optimal occlusal development in children.[8]

MATERIALS AND METHODS

Ethical considerations:
Ethical clearance for the study was granted by Institutional Ethics Committee prior to its commencement. Written informed consent was obtained from all participants and/or their legal guardians after a thorough explanation of the study's objectives and procedures. Participation was completely voluntary, with guarantees of data confidentiality and the freedom to withdraw from the study at any stage without any repercussions.

Study Population:
The research targeted children aged 6 to 12 years from the Karad region, representing the mixed dentition phase—a crucial period for assessing tooth eruption patterns and caries susceptibility. Participants were recruited from local schools and residential areas to ensure a diverse representation of the community. Only healthy and co-operative children were included, and participation was confirmed through informed consent obtained from parents or legal guardians.

Inclusion criteria and exclusion criteria:
The study included children aged 6 to 12 years who were in the mixed dentition phase. Eligible participants had at least one erupted first permanent molar and were selected from local schools and dental outpatient departments within the designated area. Participation required informed consent from parents or guardians and assent from the children. Exclusion criteria involved children younger than 6 or older than 12 years, those with special healthcare requirements or developmental conditions affecting communication or oral evaluation, those currently receiving orthodontic treatment, or those with prior dental procedures that could impact tooth eruption or caries susceptibility. Children unwilling to participate or unable to provide consent or assent were also excluded.

Data collection and quality assurance:
The survey was conducted using a structured questionnaire designed to assess dental caries and tooth eruption patterns in children, following standard research practices. To ensure convenience and wider reach, the questionnaire was shared digitally through Google Forms. An informative poster highlighting key messages about children's dental health was displayed alongside the survey to raise awareness and encourage participation. The questionnaire was made available in both English and Marathi, making it accessible and easy to understand for both children and their caregivers.

The questionnaire consisted of two sections designed to assess parental knowledge and awareness related to their child's dental development. Questions Q1 to Q5 focused on knowledge-based aspects, including the differences between primary and permanent teeth, the age of eruption of the first permanent teeth, the duration of the mixed dentition period, and the typical eruption age of the first molars. Questions Q6 to Q10 addressed general awareness and behavioral aspects, such as parents' observation of their child's first molars, awareness of the mixed dentition phase, understanding of the importance of first permanent molars, frequency of dental visits, and awareness regarding dental caries prevention. Informed consent was obtained from parents or guardians before participation. Care was taken to maintain accuracy and consistency throughout the data collection process to ensure the reliability of the findings.

RESULTS

A total of 102 parents participated in the survey assessing awareness and knowledge about the mixed dentition stage and the significance of the first permanent molars.

A strong correlation was identified between parental educational qualification and knowledge category ($\chi^2 = 28.591$, $p = 0.0119$), indicating that greater educational attainment was associated with improved awareness. However, no notable variation in mean knowledge scores was found between male and female participants ($t = -0.105$, $p = 0.9164$). (Image 1)

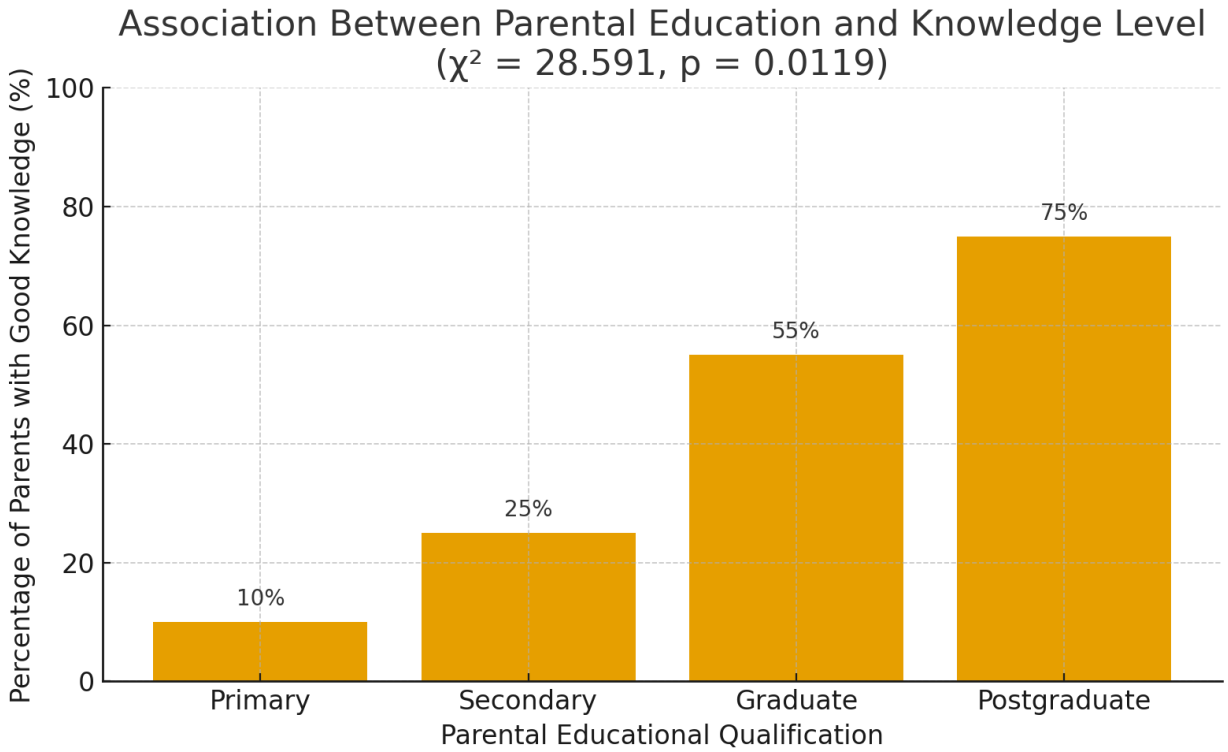

Image 1: Association Between Parental Education and Knowledge Level

A. Assessment of Knowledge Level (Q1- Q5

Table 1 illustrates the distribution of **Knowledge Scores**, which represent the scores parents obtained in **Questions 1 to 5** of the questionnaire by selecting the ideal answers related to the eruption and characteristics of permanent teeth. The results show that a majority of parents demonstrated poor knowledge, with 70.6% scoring between 0 and 1. Around 16.7% of parents had fair knowledge (scores 2–3), while only 12.7% achieved good knowledge (scores 4–5). This indicates that overall parental understanding of permanent tooth eruption patterns remains limited, emphasizing the need for greater awareness and education.

Table 1. Distribution of Parental Knowledge Scores on Eruption and Characteristics of Permanent Teeth

Knowledge Score	Number of Respondents (%)	Knowledge Level	Category-wise Percentage
0	40.2	Poor (0–1)	70.6
1	30.4	Poor (0–1)	70.6
2	6.9	Fair (2–3)	16.7
3	9.8	Fair (2–3)	16.7
4	9.8	Good (4–5)	12.7
5	2.9	Good (4–5)	12.7

B. Awareness and Practices (Q6–Q10)

Table 2 presents parental awareness related to the observation of first permanent molars, the mixed dentition period, dental visits, and caries risk (Q6–Q10). The results reveal that overall awareness levels were low across all aspects. A large proportion of parents had not noticed the eruption of their child's first molars (39.2%) and were unfamiliar with the mixed dentition period (48%). Only a small percentage correctly recognized the importance of first molars (10.8%) or had visited a dentist for molar examination (6.9%). These findings indicate limited parental understanding, highlighting the need for greater educational outreach and awareness programs on children's oral development.

Table 2. Parental Awareness on Observation of First Permanent Molars, Mixed Dentition Period, Dental Visits, and Caries Risk

Question	Aspect Assessed	Response Category	Percentage (%)
Q6	Observation of first permanent molars	Not noticed	39.2
		Aware of eruption	6.9
		Uncertain/No response	53.9
Q7	Awareness of mixed dentition period	Unfamiliar with term	48.0
		Correctly identified	10.8
		Uncertain/No response	41.2
Q8	Importance of first permanent molars	Believed they fall out like primary teeth	36.3
		Recognized importance (mastication, space maintenance)	10.8
		Uncertain/No response	52.9
Q9	Awareness of dental visits	Unaware of need for molar examination	41.2
		Visited dentist for examination	6.9
		Uncertain/No response	51.9
Q10	Awareness about caries risk	Responded “maybe”	29.4
		Acknowledged risk	13.7
		Uncertain/No response	56.9

DISCUSSION

The present survey highlights a significant deficiency in parental awareness regarding the mixed dentition stage and the eruption of the first permanent molars. Most parents (70.6%) demonstrated poor knowledge about eruption timelines and the replacement pattern of primary teeth, while only 12.7% showed good understanding. When asked about observing their child’s first permanent molars, 39.2% had not yet noticed them, and merely 6.9% were aware of their eruption—indicating missed opportunities for early preventive care. Nearly half of the respondents (48%) were unfamiliar with the term “mixed dentition,” and only 10.8% correctly identified it as the period when both primary and permanent teeth co-exist. Alarmingly, 36.3% of parents believed the first permanent molars would fall out like milk teeth, while only 10.8% recognized their essential role in mastication and space maintenance. Furthermore, 41.2% were unaware of the need for dental check-ups specific to these teeth, and only 6.9% had visited a dentist for this reason. Awareness about dental caries was also limited, with just 13.7% acknowledging that early cavities could cause long-term problems. These findings underscore an urgent need for parental education through school-based and community dental programs to enhance awareness, promote timely dental visits, and ensure the preservation of first permanent molars—key teeth, vital for proper occlusion and long-term oral health.

The findings of the present study highlight a concerning gap in parental awareness and understanding of the mixed dentition period and the role of the first permanent molars (FPMs) in establishing occlusion and long-term oral health. These results align with previous studies that have consistently emphasized the crucial influence of parental knowledge on children’s oral health outcomes, particularly during transitional dentition. [9] The first permanent molars are considered “keystone” teeth in the dental arch because they guide occlusion, contribute to mastication, and maintain space for erupting permanent teeth.[10] Their early eruption, typically around six years of age and behind the primary dentition without replacing any teeth, often leads parents to overlook their permanence, increasing the risk of neglect and early decay.[11]

Parental misconceptions regarding the eruption and importance of these teeth have been reported globally. Studies have shown that many parents mistakenly assume that first permanent molars exfoliate like primary teeth, leading to poor preventive care and delayed dental visits. [12] This lack of awareness during the mixed dentition phase, a critical developmental period when both primary and permanent teeth co-exist, may result in irreversible damage to erupting teeth, malocclusion, and caries progression. Moreover, as observed in the present study, awareness levels were significantly influenced by the parents’ educational qualification — a finding that is consistent with prior evidence linking higher parental education with better oral health knowledge and preventive behaviors.[13] Parents with greater educational exposure

are generally more likely to understand the need for early dental visits, supervise their child's brushing, and seek preventive interventions such as fluoride application and pit-and-fissure sealants.[14]

The mixed dentition phase represents a vital window for interceptive dental care. Neglect during this stage can lead to space loss, crowding, and abnormal eruption patterns. Previous research has identified that poor parental understanding of this phase directly correlates with higher caries prevalence in first permanent molars and increased orthodontic needs later in adolescence.[15] Additionally, many children develop caries in their FPMs within two to three years of eruption, largely because these teeth erupt early, have deep pits and fissures, and are difficult to clean effectively. Without adequate parental guidance and dental supervision, these newly erupted molars remain vulnerable during the so-called "post-eruptive maturation period".[16]

The lack of dental visits specifically for examination of the first permanent molars further indicates an evident gap between awareness and practice. Globally, studies have reported that most parents take their children to the dentist only in response to pain or visible decay, rather than for preventive check-ups. This reactive approach delays timely interventions such as fissure sealant application, fluoride varnish, and oral hygiene counseling. The World Health Organization (WHO) has long emphasized that early dental visits — ideally before the age of seven — are critical for preventing early childhood caries and for educating parents about eruption sequences and mixed dentition management.[14] Hence, bridging this gap requires structured awareness programs that shift parental behavior from reactive to preventive care.

Community and school-based interventions have proven highly effective in addressing such deficiencies. School dental programs serve as powerful platforms for oral health promotion because they engage both children and parents. Educational sessions integrated into school curricula, coupled with parental workshops, can significantly improve awareness about the timing and importance of the first permanent molars.[13] Visual tools such as eruption charts, posters, and digital reminders have been shown to enhance comprehension and long-term retention of dental knowledge. Incorporating practical demonstrations — for example, showing children and parents how to identify newly erupting molars and maintain them through proper brushing techniques — reinforces the educational message.

Moreover, maternal motivation and engagement play a decisive role in shaping a child's oral health behavior. Mothers often serve as the primary caregivers and are most influential in establishing daily hygiene routines. Studies have shown that motivated mothers who receive structured counseling or motivational interviewing sessions are more likely to ensure regular brushing supervision, timely dental visits, and early intervention when problems arise.[15] Such personalized educational approaches, emphasizing empowerment rather than instruction, have been linked to measurable improvements in oral hygiene and reduced caries incidence in children.

Dental professionals have an ethical and preventive responsibility to educate caregivers about this developmental milestone. Pediatric dentists, general practitioners, and school dental health teams should proactively counsel parents of children aged 5–8 years about recognizing the eruption of the FPMs and understanding their significance. Implementing a "6-year molar check" protocol during school or community dental camps could be an effective strategy for early detection of eruption, sealant application, and parental education. Periodic reinforcement through follow-up reminders, school report cards, or community newsletters can help maintain awareness and encourage preventive visits.

Preventive care, when reinforced early, reduces not only disease burden but also treatment costs and anxiety associated with later restorative or orthodontic interventions. Fluoride application, fissure sealants, dietary counseling, and reinforcement of proper brushing techniques are cost-effective strategies that should be emphasized in all outreach programs. Additionally, collaboration between dental institutions and local schools can ensure sustainability of such efforts through annual screening camps and parent-education sessions.

During the course of this research, awareness regarding the mixed dentition period and the significance of the first permanent molars was created through an informative poster. The poster highlighted key aspects such as the timeline of tooth eruption, the importance of identifying the first permanent molars, and the preventive measures necessary to maintain their health. Designed in a simple and visually appealing format, it aimed to educate parents and caregivers about recognizing these teeth and understanding their long-term role in establishing proper occlusion and overall oral health. This initiative not only enhanced knowledge but also encouraged active parental involvement in promoting good oral hygiene practices among children.(Image 2)

In summary, the present study reiterates the urgent need for enhancing parental awareness regarding the mixed dentition phase and the eruption of the first permanent molars. Focused education, maternal motivation, and accessible school-based programs can effectively bridge the knowledge gap identified. A multi-tiered preventive approach — integrating family,

school, and clinical levels — should be prioritized to safeguard the oral health of children during this critical developmental period. Strengthening these interventions will not only prevent early molar caries but will also contribute to establishing lifelong oral hygiene practices and improved quality of life.

CONCLUSION

In conclusion, this survey highlights a significant gap in parental awareness regarding the mixed dentition period and the eruption of first permanent molars—key stages in a child's oral development. Many parents mistakenly believe these molars will shed like primary teeth, leading to neglect during crucial preventive years. Limited observation of erupting molars and infrequent dental visits underscore the need for better parental education. Strengthening awareness through school programs, pediatric counseling, and community outreach can promote timely care and good oral hygiene, ensuring children transition through the mixed dentition phase with healthy, well-aligned, and disease-free permanent teeth.

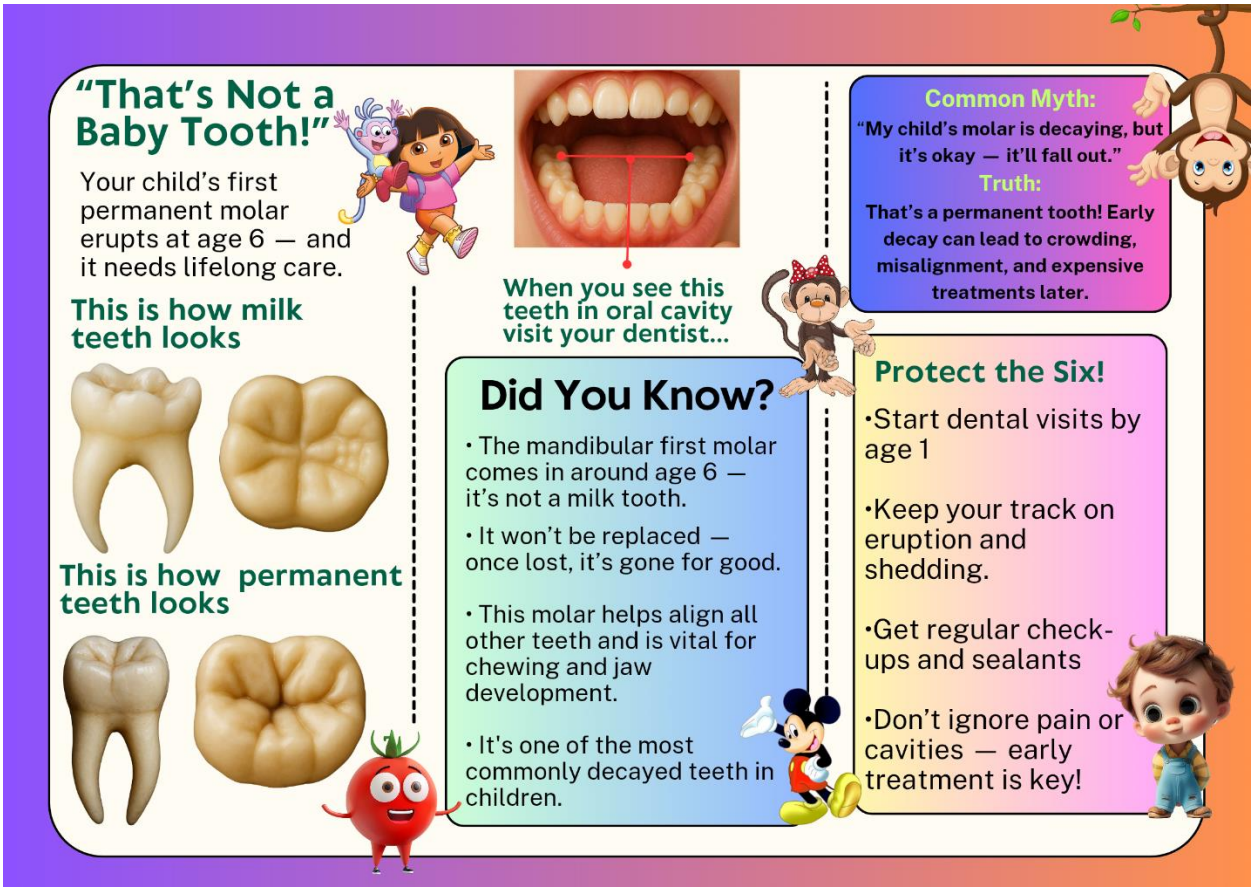

Image 2: An awareness poster was employed during the course of the research to educate participants.

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