World Journal of Advanced Research and Reviews
eISSN: 2581-9615 CODEN (USA): WJARAI
Cross Ref DOI: 10.30574/wjarr
Journal homepage: https://wjarr.com/

(RESEARCH ARTICLE)

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Level of Parental Knowledge on the Relationship between Nutritional Status and Eruption of Permanent Incisor Teeth among Students in Grades 1-2 SDN Pulorejo 1, Mojokerto City

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World Journal of Advanced Research and Reviews, 2025, 28(03), 870-876

Publication history: Received 26 October 2025; revised on 07 December 2025; accepted on 10 December 2025

Article DOI: https://doi.org/10.30574/wjarr.2025.28.3.4052

Abstract

Background: Dental health plays a crucial role in children's overall growth and development. Adequate nutrition is essential to support the proper eruption of permanent teeth, and parents in maintaining their children's oral health.

Objectives: This study aimed to assess parental knowledge regarding the relationship between children's nutritional status and the eruption status of permanent incisor teeth.

Method: This study was conducted at SDN Pulorejo 1, Mojokerto City, in December 2023. A total of 38 parents of first- and second-grade students were included using a total sampling method. Data were collected using an online questionnaire and analyzed descriptively using frequency distributions.

Results: The majority of students (76%) were classified as having normal nutritional status, while 89% of parents demonstrated good knowledge regarding the relationship between nutrition and tooth eruption.

Conclusions: Most parents exhibited good nutritional knowledge, aligning with the finding that the majority of children had normal nutritional status. Parental knowledge is an important determinant in supporting optimal child nutrition, which in turn facilitates timely eruption of permanent incisors and contributes to better oral and general health outcomes.

Keywords: Body Mass Index; Nutritional Status; Parental Knowledge; School-Age Children; Tooth eruption

1. Introduction

At the stage of growth and development of children, dental health plays a vital role as an integral component of overall health [1]. The nutritional status of a child significantly influences the process of tooth eruption [2]. Malnutrition/underweight can alter the tooth eruption by delaying the eruption of permanent teeth, while obesity can affect the child's metabolism, leading to an earlier tooth eruption (3,4]. Nutritional status can alter the eruption timing of permanent teeth, which is a highly important process in pediatric dentistry due to its influence on caries risk and timing of preventive and orthodontic intervention [4].

Optimal oral health is reflected in the proper growth of the jaws and the timely eruption of teeth according to developmental stages [5]. One of the observable indicators of this developmental process is the eruption of the mesial

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permanent incisor teeth that begins to erupt at the age of 7-8 years old [6]. This stage represents the initial transition from primary to permanent dentition, marking a critical phase in the development of the dental and jaw structures.

The eruption of mesial permanent incisors at the expected age indicates that the child's growth, development, and nutritional condition are within the normal range. Timely tooth eruption reflects optimal physiological conditions, including adequate jawbone formation, healthy gingival tissue, and sufficient nutritional reserves such as calcium, phosphorus, and vitamin D, which are essential for mineralization and tooth formation [7]. Conversely, delayed eruption of the mesial permanent incisors may suggest growth retardation or nutritional imbalances. Deficiencies in essential nutrients, including protein, calcium, phosphorus, and vitamins, can impair the formation of hard dental tissues and consequently delay the eruption process [8].

Previous research found that there is a relationship between the nutritional status and the number of permanent teeth erupted in children aged 6-7 years old. Parents have a key role in maintaining children's dental health, including an understanding of the importance of nutritional status and in relation to eruption time of permanent teeth. Parental understanding can also have a significant impact on children's dietary habits, determining nutritional patterns that can affect overall nutritional balance, and plays a central role in forming concern for dental care, which in turn can have an effect on nutritional status and comprehensive dental health [9,10].

Thus, the aim of this study is to assess parental knowledge regarding the relationship between children's nutritional status and the eruption of permanent incisor teeth among students at SDN Pulorejo 1, Mojokerto City. The findings are expected to provide a scientific basis for developing more effective health education programs that enhance parental awareness of the link between nutrition and oral health, thereby contributing to the prevention of dental problems among school-aged children.

2. Material and methods

This research employed a descriptive quantitative design. The study was conducted in December 2023 at SDN Pulorejo 1, Mojokerto City, involving 38 parents of first- and second-grade students selected through total sampling. Data were collected using an online questionnaire distributed via digital platforms. The questionnaire included four sections: (1) demographic data (chronological age of the child), (2) anthropometric measurements (body weight and height), (3) tooth eruption status, and (4) parental knowledge regarding the relationship between nutrition and tooth eruption. Parental knowledge was assessed using a structured questionnaire, and results were categorized as good, moderate, or poor based on percentage scores. Nutritional status was calculated using Body Mass Index (BMI) for age (BMI/U) z-scores according to WHO growth standards. The BMI was calculated as weight (kg) divided by height squared (m^2). Nutritional categories were defined as underweight, normal, overweight, or obese. Data were analyzed descriptively using frequency and percentage distributions to describe patterns of nutritional status and parental knowledge.

3. Results

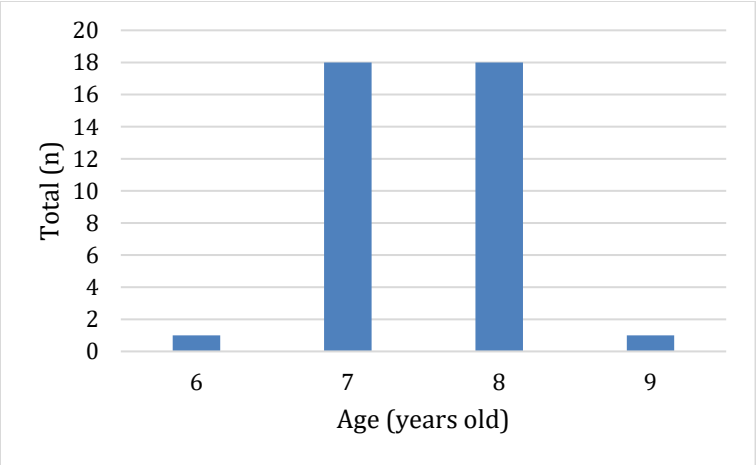

Figure 1 Age distribution of Grades 1-2 SDN Pulorejo 1

Figure 1. presents the age distribution of the study sample, confirming that the grades 1-2 student participants from SDN Pulorejo 1, Mojokerto City, ranged primarily between 7 and 8 years of age.

Table 1 Distribution of nutritional status and tooth eruption

Nutritional Status	n	%
Thin (T)	3	7,9%
Normal (N)	29	76,3%
Overweight (OV)	4	10,5%
Obese (OB)	2	5,3%
Eruption of Teeth		
Not yet erupted	10	26,3%
Already erupted	28	73,7%

Table 1. shows that individuals classified as underweight for 3 respondents (7,9%), those with a normal nutritional status total 29 respondents (76,3%), respondents classified as overweight amount to 4 individuals (10,4%), and those identified with obesity, or very overweight, constitute 2 respondents (5,3%). Furthermore, the overview of permanent tooth eruption indicates that 28 respondents (73,7%) have experienced tooth eruption, while 10 respondents (26,3%) have not yet erupted. This data highlights the diverse nutritional statuses and dental developmental stages among the surveyed individuals, providing valuable insights into the health and oral hygiene aspects of the population.

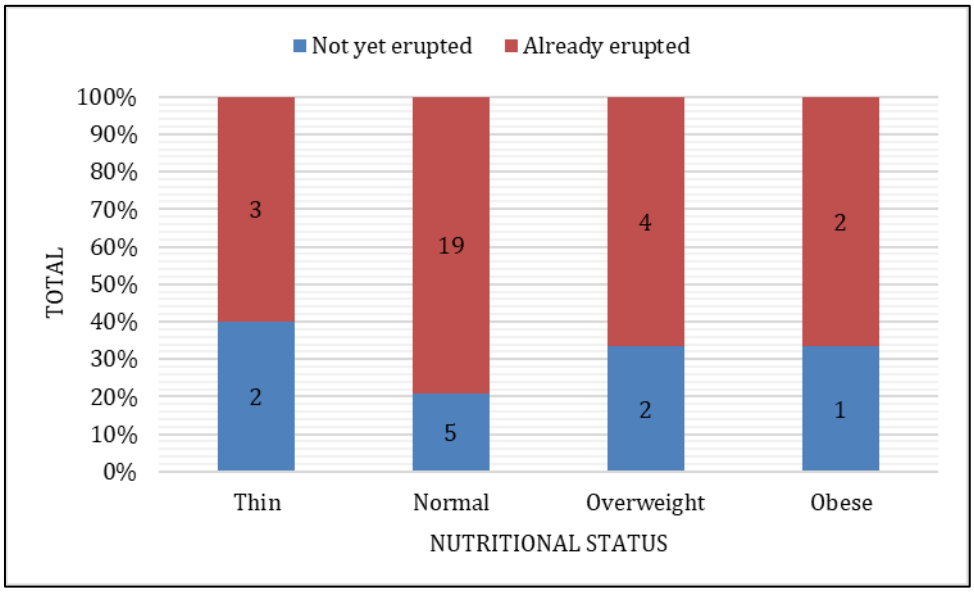

Figure 2 Relationship Between Nutrition and Tooth Eruption

Based on Figure 2, it is evident that the eruption status of teeth varies according to nutritional status. For individuals classified as normal nutritional status have a less percentage (20,8%) of delayed eruption, while the individuals with imbalance nutritional status have a percentage more than 30%.

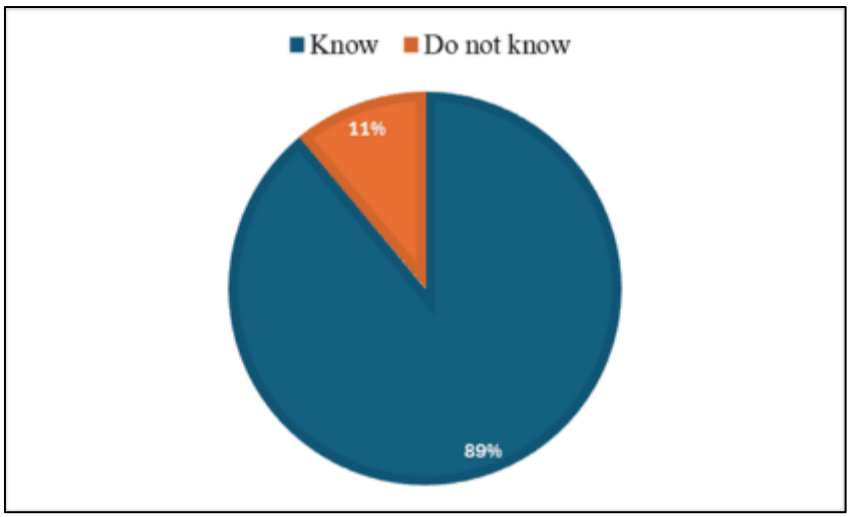

Figure 3 Percentage of Parental Knowledge

Figure 3 demonstrates that the majority of parents (89%) possessed a good level of knowledge regarding the relationship between nutritional status and tooth eruption, while 11% demonstrated a moderate level of knowledge. None of the respondents were classified as having poor knowledge.

4. Discussion

The research findings reflecting the nutritional status of students at SDN 1 Pulorejo indicate that the majority (76,3%) fall into the category of good nutritional status, providing a positive portrayal of their nutritional conditions. This discovery suggests a well-balanced utilization of nutrients present in the foods consumed by these students [11]. The study can be interpreted as evidence that appropriate dietary patterns significantly contribute to optimal nutritional status. Achieving good nutritional status is possible when the consumed food provides a sufficient amount of nutrients for the body aligns with these findings [12]. Consequently, it can be concluded that the importance of a balanced diet and adequate nutrition plays a crucial role in achieving good nutritional status among students at SDN 1 Pulorejo [13].

The relationship between nutritional status and the eruption of permanent incisors shows that most children with normal, overweight, and obese nutritional status have already experienced permanent incisor eruption. The study conducted by Virginia [14] emphasizes that nutritional intake plays a crucial role during the early stages of growth and development, as the formation and development of teeth and oral tissues are influenced by the adequate availability of essential nutrients, including calcium, phosphorus, fluoride, protein, carbohydrates, and vitamins. Conversely, nutritional deficiencies resulting from inadequate nutrient intake may lead to delayed eruption of permanent teeth. This phenomenon occurs because individuals with good nutritional status receive sufficient essential nutrients such as calcium, phosphorus, fluoride, protein, carbohydrates, and vitamins, which facilitate the acceleration of tooth growth and development.

The proportion of delayed eruption was lower (20,8%) among children with normal nutritional status compared to those with imbalanced nutrition (>30%). This pattern is consistent with the biological role of adequate nutrition in supporting tooth germ development, alveolar bone growth, and the hormonal regulation required for timely eruption [15]. However, in certain situations, overweight children may experience delayed tooth eruption due to excessive snack consumption, leading to dental damage that ultimately hinders tooth growth [16]. Therefore, it can be concluded that the nutritional status and dietary patterns, especially snacking habits, significantly influence the dental development in children [17].

The number of respondents categorized as having a very overweight or obese nutritional status reached 2 students, where both of them have experienced the eruption of the first permanent incisor in line with the expected time, while another student is facing delayed eruption or has not erupted at all. This fact reflects consistency with research findings related to the very overweight nutritional status in children, indicating that children with a very overweight nutritional status tend to have permanent teeth that have erupted, sometimes even prematurely [18]. This provides a consistent picture that the relationship between a very overweight nutritional status and the development of permanent tooth eruption in children can be identified as a recurring pattern [19].

The overweight condition in an individual often has an impact on dental health, especially in the context of delayed tooth eruption [20]. This is generally associated with a tendency to consume snacks excessively. An increased intake of high-calorie snacks can trigger dental health problems, such as tooth decay, which in turn can hinder the process of permanent tooth eruption [21]. Therefore, it is crucial for individuals with a tendency towards overweight nutritional status to pay attention to their food consumption patterns, aiming to maintain dental health and support optimal tooth eruption development [22].

Based on Figure 2, it can be concluded that the majority of parents of students in grades 1 and 2 at SDN 1 Pulorejo have a fairly good understanding (amounting to 89%) of the relationship between a child's nutritional balance and the eruption time of teeth. This indicates the awareness of parents regarding the importance of monitoring their children's nutritional patterns as a factor that can influence dental development. Success in comprehending this connection serves as a crucial foundation in efforts to provide optimal care and nutritional education for children, thereby establishing a solid foundation for dental health from an early age.

The present findings, which demonstrate a positive correlation between parental knowledge and children's nutritional status, are strongly supported by recent literature. Sari et al. [23] reported that maternal nutritional knowledge is significantly associated with the nutritional status of young children. Mothers with a higher level of nutritional awareness tend to provide more diverse and balanced diets, which in turn contribute to maintaining a normal Body Mass Index (BMI) among their children. This aligns with the study conducted by Rahmawati and Sari [24], which identified parental education and nutritional knowledge as strong predictors of the nutritional status of school-aged children.

This study indicates a parental knowledge on the relationship between nutritional status and tooth eruption, where children with good nutrition tend to experience timely tooth eruption. A recent study by Lestari, Abdi, and Yunus [25] specifically reported a strong correlation between nutritional status and the eruption of permanent teeth among Indonesian children aged 6–12 years. On a global scale, a systematic review by Al-Maweri et al [26] confirmed that nutritional status significantly influences the timing of tooth eruption, both for primary and permanent dentition. The review concluded that children with excessive nutritional status (overweight/obesity) tend to experience accelerated tooth eruption compared to those with normal body weight, whereas children with poor nutritional status consistently exhibit delayed tooth eruption.

Nutritional knowledge extends beyond the selection of food types; it also encompasses an understanding of meal frequency, appropriate portion sizes, and the importance of limiting high-sugar foods that may contribute to dental problems. The high proportion of respondents in this study with good parental knowledge (89%) possibly represents a valuable social asset and likely underpins the finding that most children (76,3%) had a normal nutritional status and had already experienced the eruption of the first permanent incisor (73,7%). Therefore, parental knowledge serves as a crucial first line of defense in fostering a healthy nutritional environment for children.

The majority of students in grades 1-2 at SDN Pulorejo 1 exhibit normal nutritional status, although the small proportion does not. The Indonesian government program launched in 2025, called Makanan Bergizi Gratis (MBG), has been shown to generate positive impacts on children's health. This initiative was designed to address issues of malnutrition, particularly among school-aged children, and has contributed to improvements in nutritional status [27]. The long-term purpose of the program includes reductions in stunting and malnutrition rates among school-age populations, indicating meaningful progress in child growth and development [28].

The limitations of this study include the small number of respondents and the fact that they were drawn from only one school, which restricts the generalizability of the findings to a broader population. The use of an online questionnaire may also introduce inaccuracies in responses. The children's nutritional status was determined solely based on BMI-for-age, which does not fully represent their overall nutritional condition. Additionally, the assessment of tooth eruption was conducted at a single point in time, making it impossible to observe changes or developmental progression over time.

Future studies are recommended to conduct similar research following the implementation of the Makanan Bergizi Gratis (MBG) program to evaluate its specific impact on children's nutritional and dental developmental outcomes. Longitudinal or post-intervention designs would allow researchers to determine whether the improvements in nutritional status observed after MBG translate into measurable changes in the timing and patterns of permanent tooth eruption. Additionally, comparing cohorts before and after the program would provide stronger evidence regarding the effectiveness of MBG in addressing malnutrition and supporting overall child growth. Such follow-up studies are

essential for informing policy adjustments and ensuring that national nutrition programs continue to deliver meaningful health benefits for school-aged children.

5. Conclusion

The findings demonstrate that the majority of parents (89%) had good knowledge of the relationship between nutritional status and tooth eruption, corresponding with 76% of students exhibiting normal nutritional status. Parental knowledge is a key factor supporting optimal nutrition, which in turn facilitates timely eruption of permanent incisors and promotes overall oral and general health

Compliance with ethical standards

Acknowledgments

The researcher would like to thank the teachers and parents of class 1-2 of SDN Pulorejo 1 Mojokerto City who have supported and helped us in providing data and information for this research.

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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