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Relationship of Nutritional Status with Permanent Tooth Eruption in Primary School-Age Children (6-12 Years) Literature Study Review

[1]*Armita Linda Indryani, [2]Siti Alfah, [3]Junaidin, [4]Nur Ekawati, [5]Sangkala

[1,]Mahasiswa D-III Kesehatan Gigi Stikes Amanah Makassar, [2,3,4,5] Dosen Stikes Amanah Makassar

[*]Authors Correspondence: sitialfah81@gmail.com /+62 821-8848-9090

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ABSTRACT

Nutritional status is a requirement to determine whether a person is in a healthy state which is influenced by several factors, namely diet and adequacy of nutrients to carry out a normal metabolism. Some nutrients that can affect the growth and development of tooth eruption time include the large intake of vitamin D, calcium, phosphorus, and flour in the body. Deficiencies in nutrients can inhibit the process of tooth growth and development and slow down the time of tooth eruption. Tooth eruption is the process of moving teeth from the jawbone towards the oral cavity. Tooth eruption can be influenced by several factors, one of which is the nutritional status which is the state of the body as a result of food consumption and the use of nutrients. The purpose of this study was to elaborate on the relationship of nutritional status with permanent tooth eruptions in children of primary school age (6-12 years). This type of research uses a type of literature study research. Journal searches were conducted from 2017-2022 on Google Scholar and Pubmed databases in Indonesian and English. Journal search strategies use the keywords "permanent tooth eruption" and "nutritional status". Journals are selected based on inclusion and exclusion criteria that will be reviewed. Based on the results of the literature review in 6 journals, it can be concluded that 4 journals state that there is a relationship between nutritional status and permanent tooth eruption in children of primary school age (6-12 years). Therefore, it is important to understand by health workers to improve nutrition programs in children and for parents to pay more attention to nutrition in children so as not to experience disturbances in the permanent tooth eruption process.

INTRODUCTION

Nutrition is something that must be possessed by humans to meet the needs of the body and to maintain the basic physiological body. Nutritional status is a requirement to determine whether a person is in a healthy state which is influenced by several factors, namely diet and adequacy of nutrients to carry out a normal metabolism. If the nutrients needed in the body are not met, then the nutritional status will be less, and vice versa if the nutrients obtained are excessive, the nutritional status will become obese.[1]

Good nutrient intake in children is needed for the growth process. In school-age children (6-12 years) the growth and development of height and weight will increase with age. There are 2 factors that affect children's growth, namely genetic factors and environmental factors (especially nutritional intake). Nutritional problems in children or commonly referred to as malnutrition will affect the process of growth and development, both in general and specifically in the eruption of permanent teeth in children.[2]

According to data from the World Health Organization (WHO), the United Nations Children's Fund (UNICEF), and the World Bank 2016 published in the Global Nutrition Report 2017, there were 155 million children worldwide who were stunted, 52 million children who were wasting, and 41 million children who were

overweight.36 Nationally in 2017 for children aged 5-12 years there were 3.4% of children were very thin and 7.5% of children were thin. For the province of South Sulawesi alone, there are 3.62% of children aged 5-12 years are very thin and 9.6% of children aged 5-12 years are thin.[18]

Some nutrients that can affect the growth and development of tooth eruption time include the large intake of vitamin D, calcium, phosphorus, and flour in the body. Deficiencies in these nutrients can inhibit the process of tooth growth and development and slow down the time of tooth eruption.[3]

Tooth eruption can be interpreted as the state of teething over the gums in the oral cavity4. Tooth eruption is the process of moving a tooth seed from the jawbone towards the oral cavity. The dental eruption can be said to be a continuous process that begins as soon as the dental crown is formed. At the same time, the jawbone will increase in length and height, causing movement from the entire milk tooth seed towards the occlusal surface.[5]

The permanent tooth that first grows or appears/erupts when the child is 6-7 years old is the first Molar tooth (M1), this tooth is often also called the six years molar. The M1 tooth is the largest permanent tooth among the other dentition and begins to erupt after the growth and development of the jaw is sufficient to provide a place for eruption.[5]

The percentage of permanent tooth eruptions in a child who is not on time exceeds 45%. This is due to the high numbers of caries in the deciduous teeth which results in premature removal of the firstborn teeth.[6] The process of growing permanent teeth starts from the age of 6-12 years with a total of 28 teeth. Permanent teeth grow completely after the third or youngest molar appears, usually at the age of 17-25 years so that the number of complete permanent teeth becomes 32 teeth.[7] There are many factors that affect the time of tooth eruption, one of which is nutrition which can cause the eruption to be late.[5]

Based on research by the United States National Health and Nutrition Examination Survey [8] In children aged 5-12 years showed that children with obese nutritional status had teeth that erupted faster than non-obese children. Teeth in obese children tend to erupt earlier than non-obese children by 1.44%. In a study using a sample of 1,499 children in 3 countries, namely Cambodia, Indonesia, and Laos, it was found that children with underweight or thin and stunted had a significant relationship with the eruption of permanent teeth where permanent teeth erupted more slowly in children who were stunted and underweight.[9]

Based on the background description above, the author is interested in conducting a literature studies researches entitled The Relationship of Nutritional Status with Permanent Tooth Eruption in Elementary School Age Children (6-12 Years). The formulation of the problem in this study, namely: "How is the relationship between nutritional status and permanent tooth eruption in children of primary school age (6-12 years)? "This study aims to decipher the relationship of nutritional status with permanent tooth eruption in children of primary school age (6-12 years). In particular, this study will outline each of the nutritional status and conditions of the permanent tooth eruption period in children of primary school age (6-12 years).

METHOD

The type of research used is a literature study prepared based on the 2019 prism checklist guidelines with the method of collecting library data, reading and recording, and processing research materials.

A literature study looking for theoretical references that are relevant to the case or problem found. The reference contains nutritional status and permanent tooth eruption.

The search keywords used are as follows:

1. *Permanent teeth eruption*
2. *Nutritional status or nutritional status or body mass index or nutritional status of children*

Nutritional status with permanent tooth eruption in children of primary school age. The data used comes from books, journals, scientific articles, google scholar, and PubMed which contains the Relationship of Nutritional Status with Permanent Tooth Eruption in Elementary School Age Children (6-12 Years).

RESULTS

Research Journal Search Results Below are some journals on nutritional status and the eruption period of permanent teeth.

No.	Peneliti (tahun)	Judul	n	Hasil Penelitian
1.	Sitinjak, A. C., Gunawan, P. N., & Anindita, P. S. (2019)	*Hubungan Status Gizi dengan Erupsi Gigi Molar Pertama Permanen Rahang Bawah pada Anak Usia 6-7 Tahun di SD Negeri 12 Manado*	60	Of the 60 subjects, 61.7% classified as normal nutritional status and 95% of permanent first molar teeth of the lower jaw had erupted. The number of girls with permanent first molar tooth eruption of the lower jaw is greater than that of boys
2.	Kristiani, A., Primawati, R. S., & Fatimah, E. S (2017)	*Hubungan Status Gizi dengan Erupsi Gigi Molar Pertama Tetap pada Murid Kelas 1 SDN Cisitu 02 Kebupaten Garut*	24	The nutritional status of grade 1 students of SDN Garut in 2016 was thin (54.2%). The first molar tooth eruption remained in grade 1 students of SDN Cisitu 02 Garut Regency in 2016, the most were those who had erupted 2 teeth (58.4%).
3.	Zakiyah, F., Prijatmoko , D., & Novita, M (2017)	*Pengaruh Status Gizi terhadap Erupsi Gigi Molar Pertama Permanen Siswa Kelas 1 SDN di Kecamatan Wilayah Kota Administrasi Jember*	238	There is a meaningful difference between the nutritional status of students and the eruption of permanent first molar teeth
4.	Lailasari, D., Zenab, Y., Herawati, E., & Wahyuni, I. S. (2018)	*Correlation between permanent teeth eruption and nutrition status of 6-7-years-old children*	57	There is a relationship between nutritional status and the number of fixed teeth that erupt
5.	Kartika, I., & Zainur, R. A. (2021)	*Hubungan Status Gizi terhadap Erupsi Gigi Incisivus Sentralis Permanent Mandibula pada Anak Usia 6-7 Tahun*	60	From 60 samples, the average nutritional status was normal. There were 22% of children aged 6-7 years who had not experienced the eruption of permanent mandibular centralist incision teeth, the nutritional status of respondents was not in the normal category
6.	Jasmine, A. B. (2020)	*Faktor Risiko Status Gizi Dan Erupsi Gigi Tetap Premolar-2 Pada Anak Usia 10 Tahun Di Kecamatan Tuah Negeri*.	45	There were 12 children (26.7%) stunted and 33 children (73.3%) not stunted. In stunted children, there were 8 children (66.7%) who had not erupted the upper right premolar-2 tooth and 7 children (58.3%) who had not erupted the upper left premolar-2 tooth

DISCUSSION

Nutrients are substances contained in food and are indispensable by the body for metabolic processes. The situation caused by the balance between nutritional intake from food and the use

of nutrients in the body is called nutritional status. The intake of nutrients needed by each individual is different based on age, gender, and activity. If the intake of nutrients in the body is not met, then the nutritional status will become malnourished, if the nutrients in the body are met then, the nutritional status will become good nutrition, as well as if the nutrients received are excessive, the nutritional status will become more nutrition. [24]

Good nutritional intake in children is needed in the process of growth and development, especially in school-age children (6-12 years). In this school-age child, his height and weight growth will increase. There are two factors that affect growth in a child, namely genetic factors and environmental factors (especially nutritional intake). If the child experiences nutritional problems (malnutrition) it will affect the process of growth and development, both in general and specifically in the eruption of permanent teeth.[2]

Some nutrients are indispensable in the process of tooth growth and development, namely vitamin D, calcium, phosphorus, and flour. The main function of vitamin D is to help the formation and maintenance of bones. Calcium and phosphorus are the main ingredients in the formation of dentin and tooth enamel. Flour also plays a role in the process of mineralization and hardening of tooth enamel. If these substances are lacking in the body, they will inhibit the process of growth and development of teeth so as to slow down the eruption of teeth.[11] Tooth eruption is the process of moving teeth from within the alveolar bone towards the oral cavity. The first permanent tooth of the eruption is the first molar of the lower jaw at the age of 6-7 years.[25]

Based on the results of research on the relationship of nutritional status with the eruption of the permanent first molar tooth of the lower jaw in children aged 6-7 years at SD Negeri 12 Manado, it shows that there is no relationship between nutritional status and the eruption of the first permanent tooth of the lower jaw. Children with more nutritional status, normal, or less, have more first molar teeth of the lower jaw that have erupted than those who have not erupted.[26] The dental eruption process can be influenced by several factors, namely genetics, gender, weight, race, systemic disease, hormones, and vitamins. [22] This is in line with the results of research which states that the factors that greatly influence the tooth-eruption process are not nutrition but genetic, gender, and systemic disease factors. [27]

Research on the relationship of nutritional status with the eruption of the first molar tooth remains in grade 1 students of SDN Cisitu 02 Garut Regency shows that there is no significant relationship between nutritional status and the eruption of the first molar tooth in grade 1 students of SDN Cisitu 02 Garut Regency in 2016. Children with normal nutritional status and thin most of their first molar teeth have erupted. This is because there are many things that affect tooth eruption apart from nutritional factors.[28] This is supported by the statement that the process of dental eruption can be influenced by intrinsic factors such as race, genetics, and sex while extrinsic factors such as nutrition and economic level. [29] These results are in line with research in India stating that the process of tooth eruption is more influenced by genetics.[30]

The results of another study conducted on the effect of nutritional status on the eruption of permanent first molar teeth of grade 1 SDN students in the Jember Administrative City Regional District showed that there was a significant influence between nutritional status and the eruption of permanent first molar teeth of grade 1 SDN students in the Jember Regency Administrative City Area District. The fastest dental eruption was found in children who had normal nutritional status, namely 105 students (44.1%) followed by children with obese nutritional status, namely 76 students (31.9%) and finally thin nutritional status, namely 11 students (4.6%).[31]This is in line with the results of research that the higher the nutritional status of the child, the eruption of the permanent molar teeth of the lower jaw can erupt in time. 32 This is supported by the statement that if the nutrients received by the body are sufficient, the nutritional status of the child will be normal so that the growth and development process also runs normally. [24]

The results of research on the Correlation between permanent teeth eruption and nutrition status of 6-7-years-old children show that there is a relationship between nutritional status and the number of permanent teeth that erupt, the higher the nutritional status of a child, the faster the permanent tooth erupts.[33] These results are supported by studies that say that children with obese nutritional status have an average number

of teeth that have erupted faster than children with normal nutritional status and are thin. This is because, in children with obese nutritional status, the nutrients received by the body are more than enough. [8]This result is supported by research conducted at SD Negeri 70 Manado which states that there is a significant relationship between nutritional status and permanent tooth eruption where students with fat nutritional status have permanent teeth that have erupted.10 This is according to the theory that if the nutrients received by the body are excessive, the nutritional status in children will become obese.[24]

The results of research on the relationship of nutritional status to the eruption of the permanent incisor incision of the mandible in children aged 6-7 years showed that there was a relationship between nutritional status and the eruption of the mandibular permanent incisive tooth in children aged 6-7 years. The average child at SD Negeri 2 Tegal Mulyo has a normal nutritional status, this is because the child's body gets enough nutrients.[34] This is in line with research that states that a person will have a good nutritional status if the food consumed is able to provide sufficient amounts of substances for the body.[10] This research is in accordance with the theory that says that several important substances needed in the tooth-eruption process include vitamin D, calcium, phosphorus, and flour. If the substance is sufficient in the body, then the eruption in the teeth will be right according to the time.[11]

Based on the results of research on risk factors for nutritional status and premolar-2 fixed tooth eruption in children aged 10 years in Tuah Negeri District, it shows that there is a significant relationship between nutritional status and tooth eruption in 10-year-olds in Tuah Negeri District. Children who are stunted are more at risk of delayed eruption of the upper premolar-2 teeth. This nutritional factor disorder will affect the tooth eruption process in children because there will be a deficiency of protein, vitamin D, calcium, and phosphorus.[35]This is supported by the theory that says that the main function of vitamin D is to help the formation and maintenance of bones, while calcium and phosphorus are the main ingredients in the formation of dentin and tooth enamel.[11]The results of this study are also in line with the results of the study which states that children with good nutritional status and fat have teeth that have erupted according to the age of the eruption than children with malnourished status have teeth that have not erupted according to the age of the eruption.[10]

CONCLUSION AND RECOMMENDATION

Based on the results of supporting data sourced from existing journals and references, the following conclusions can be drawn:

1. There is a relationship between nutritional status and permanent tooth eruption in children of primary school age (6-12 years). Children with overnutrition/obesity will experience faster tooth eruption compared to normal child nutrition. Children with malnourished status will be at risk of delayed eruption of permanent teeth.
2. Most children of primary school age (6-12 years) have normal nutritional status, but there are still children with overnutrition/obesity status and malnutrition status.
3. The period of eruption of permanent teeth in children of primary school age (6-12 years) is mostly just in time.

Based on this conclusion, several things can be suggested, including:

1. Can be input for health services in improving child nutrition programs to improve the degree of health, especially dental and oral
2. Can be an input to the entire community, especially parents, to pay attention to nutrition and children's dental health

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