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Dental caries of stunting and underweight toddlers aged 3-5 years old among Pandhalungan community

Cárie em crianças de 3 a 5 anos com baixa estatura e baixo peso da comunidade Pandhalunga

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ABSTRACT

Objective: Toddler dental caries can interfere with children's nutritional conditions, toddlers have difficulty eating and disturbing sleep rhythms, where growth hormones work optimally when toddlers sleep. The study aims to identify and analyse the difference between dental caries of stunting and underweight toddlers aged 3-5 years old among Pandhalungan community. **Material and Methods:** An analitical observational study with a cross-sectional approach was performed in Panduman village, Tegalbesar, Jember. The population was 530 stunting toddlers and 162 underweight toddlers. The sample was 114 stunting toddlers and 114 underweight toddlers selected by simple random sampling. The variable was the dental caries of stunting and underweight toddlers. The dental caries was checked by the inspection in the light space. The information of stunting and underweight toddlers was obtained from the public health center data. The data were analysed by descriptive statistical test and continued by Mann-Whitney U test . The majority age of the toddlers was 49-60 months with 73.68% from stunting toddlers and 71.05% from underweight toddlers. **Results:** The majority of the parents' recent education was low, which were in junior high school and primary school. The average dental caries of stunting toddlers was 5.07 and 5.67. The test resulted Asymp. Sig. (2-tailed) 0.159 less than α(0,05) that means there was no difference between dental caries of stunting and underweight toddlers. **Conclusion:** There was no difference between dental caries of stunting and underweight toddlers.

KEYWORDS

Community; Dental caries; Minors; Stunting; Underweight.

RESUMO

Objetivo: A cárie infantil pode interferir nas condições nutricionais das crianças, as crianças têm dificuldade para comer e podem apresentar distúrbio noritmo do sono, onde os hormônios do crescimento funcionam de maneira ideal quando as crianças dormem. O estudo tem como objetivo identificar e analisar a diferença entre cárie dentária de crianças entre 3 e 5 anos com baixa estatura e com baixo peso na comunidade Pandhalunga. **Material e Métodos:** Um estudo observacional analítico com abordagem transversal foi realizado na aldeia de Pandhalungan, Tegalbesar, Jember. A população era de 530 crianças com baixa estatura e 162 crianças com baixo peso. A amostra foi de 114 crianças com baixa estatura e 114 crianças com baixo peso, selecionadas por amostragem aleatória simples. A variável foi a cárie de crianças com baixa estatura e baixo peso. A cárie foi verificada pela inspeção em um ambiente claro. As informações sobre crianças com baixa estatura e baixo peso foram obtidas a partir dos dados do centro de saúde pública. Os dados foram analisados pela estatística descritiva e pelo teste de Mann-Whitney. A idade da maioria das crianças era de 49 a 60 meses, com 73,68% de crianças com baixa estatura e 71,05% de crianças com baixo peso. **Resultados:** A escolaridade recente da maioria dos pais era baixa, os quais cursaram o ensino fundamental e o ensino médio. A média de cárie dentária em crianças com baixa estatura foi de 5,07 e 5,67. O teste resultou em Asymp. Sig. (bicaudal) 0,159 menor que α (0,05), o que significa que não houve diferença entre cárie dentária em crianças com baixa estatura e baixo peso. **Conclusão:** Não houve diferença entre cárie dentária em crianças com baixa estatura e baixo peso.

PALAVRAS-CHAVE

Baixa estatura; Baixo peso; Cárie; Comunidade; Menores.

INTRODUCTION

In Indonesian context, 37% of toddlers experienced stunting and 12% of them experienced underweight [1]. 87% of stunting toddlers suffered dental caries. The toddlers with a severe dental caries were 2.15 times more likely to experience stunting than those with low dental caries [2]. Caries was one of the factors of stunting among toddlers [3]. There was the correlation between stunting and dental caries among children [4]. The toddlers with a severe dental caries had 5-time probability of decrease in nutritional status that led underweight condition [5]. 1 (3.3%) out of 30 stunting toddlers suffered very low category of dental caries, 3 toddlers (10%) suffered low category of dental caries, 4 toddlers (13.3%) had medium category of dental caries, 13 toddlers (43.4%) had high category of dental caries, and 9 toddlers had very high category of dental caries [6]. In general, stunting and underweight influenced the growth of toddlers' motor and mental. Meanwhile in oral cavity, stunting related to reduced resistance to microbial biofilms and decreased salivary flow that influenced individual's oral health which played the main role in the toddler's life quality. One of the most frequent problems of oral health was dental caries [7].

The main problem of dental and oral health for toddlers is dental caries. Dental caries is a dental tissue disease characterized by tissue damage, starting from the enamel which is the surface of the tooth, dentin, and extending towards the pulp. Dental caries is one of the most common forms of tooth decay experienced by preschool children, which can interfere with the growth and development process.

Pandhalungan community in Jember is a hybrid society due to compound of two dominant cultures, Madura and Java, also Islam in Tapal Kuda area [8]. Cultural behavior has crucial implication on human's health. Cultural factor plays a role in changing health behavior dynamically among societies [9]. The current study aims to identify and analyze the difference between dental caries of stunting and underweight toddlers aged 3-5 years old among Pandhalungan community.

MATERIALS AND METHODS

Sample selection

An analitical observational study with a cross-sectional approach was performed in Panduman village, Tegalbesar, Jember. Panduman and Tegalbesar are villages with the highest prevalence of undernutrition [10]. The population was 530 stunting toddlers and 162 underweight toddlers. The sample was 114 stunting toddlers and 114 underweight toddlers selected by simple random sampling with Slovin's formula. The variable was dental caries of stunting and underweight toddlers.

Data collection

The dental caries was measured or checked by the inspection in the light space. The toddlers were asked to open their mouth with the help of mouth mirror, dental probe, and torch. It was to count the dental caries with five categories, namely Pulp Irritation (IP), Pulp Hyperemia (HP), Pulpitis, Pulp Gangrene (GP), and Radix Gangrene (GR). The result was written on the provided form that was also containing respondents' characteristics data. The information regarding stunting and undernutrition toddlers were obtained from the data of public health center. Then the researchers conducted a re-measurement in the research. The data were analysed by descriptive statistical test and continued by Mann-Whitney U test (SPSS 23 programmed) to analyse the dental caries of stunting and undernutrition toddlers aged 3-5 years old among Pandhalungan community.

Ethical aspect

Categories for evaluating caries come from previous instruments in the form of: a. Providing informed consent and information for consent to parents/guardians of research subjects; b. Body weight measurement with Camry brand digital weight scales with a capacity of 150 kg, 50-gram accuracy, and 3A alkaline battery. Before measurement, the tool was calibrated first; and c. Size of height with a microtoise stature meter. The study was approved by the Ethics Committee of Faculty of Dentistry, University of Jember, with the number of 1600/UN25.8/KEPK/DL/2022.

RESULTS

The data analysis resulted several information. The respondents' characteristics based on age and gender are provided in Table I. From 114 stunting toddlers, 84 toddlers (73.68%) were 49-60 months, 30 toddlers (26.32%) were 36-48 months. From 114 underweight toddlers,

81 toddlers (71.05%) were 49-60 months, 33 toddlers (2895%) were 36-48 months.

The respondents' characteristics based on parents' recent education are available in Table II. The most parents' recent education level was Junior High School and Primary School in stunting or even underweight toddlers categories. 58 stunting toddlers (50.88%) had parents with the recent education level of Junior High School, 41 stunting toddlers (35.96%) had parents with the recent education level of Primary School, and 16 stunting toddlers (14.04%) had parents with the recent education level of Senior High School. Meanwhile, 63 underweight toddlers (55.26%) had parents with the recent education level of Junior High School, 38 underweight toddlers (33.33%) had parents with the recent education level of Primary School, and 13 underweight toddlers (11.40%) had parents with the recent education level of Senior High School. There was no parent of stunting and underweight toddlers with the recent education level of Bachelor degree.

The average score of dental caries of stunting and underweight toddlers is displayed in Table III. Stunting toddlers had average of dental caries as many as 5.07 with the high category and underweight toddlers had average of dental caries as many as 5.67 with the same category, high category. The test of dental caries difference of stunting and underweight toddlers can be seen in Table IV. The test resulted Asymptotic Significance (2-tailed) 0.159 less than α(0,05) that means there was no difference between dental caries of stunting and underweight toddlers.

Table I - Character of Stunting and Underweight Toddlers Based on Age and Gender

Age (Month)	Stunting	Underweight
36-48	30 (26.32%)	33 (28.95%)
49-60	84 (73.68%)	81 (71.05%)
Total	114	114

Table II - Character of Stunting and Underweight Toddlers Based on Parents' Recent Education

Number	Parents' Recent Education	Stunting	Underweight
1.	Primary School	41 (35.96%)	38 (33.33%)
2.	Junior High School	58 (50.88%)	63 (55.26%)
3.	Senior High School	16 (14.04%)	13 (11.40%)
4.	Bachelor	0 (0%)	0 (0%)
Total		114 (100%)	114 (100%)

Table III - Average Score of Dental Caries of Stunting and Underweight Toddlers

Number	Nutritional Status	Average of Dental Caries	Category
1.	Stunting	5.07	High
2.	Underweight	5.67	High

Table IV - The Test of Dental Caries Difference of Stunting and Underweight Toddlers

	Dental Caries
Mann-Whitney U	5805.000
Wilcoxon W	12360.000
Z	-1.409
Asymp. Sig. (2-tailed)	.159

DISCUSSION

The majority of stunting and underweight toddlers were aged 49-60 months. Globally, approximately one out of four toddlers experience stunting. 16% of them are underweight and 8% of them are wasting [11]. The study in Indian context showed the occurrence of picky eater among three-year-old toddlers were 56.1%, four-year-old toddlers were 64.7%, and five-year-old toddlers were 68% [12]. The toddler growth failure can be seen in the age of over 36 months [13]. The toddlers aged under 36 months constitute passive individuals in which they receive food provided by their parents. While the toddlers aged over 48 months constitute active individuals in which they are picky-eating. They can choose the food they like or even refuse the food they dislike [14,15].

The majority of education of stunting and underweight toddlers' parents were junior high school and primary school which were in low level. There was no parent with bachelor degree. This is in line with Khan's study in 4 provinces, namely Punjab, Sindh, Khyber Pakhtunkhwa, and Balochistan Pakistan that showed only 25.7% of stunting toddlers had parents with high education level, 74.3% of them had parents with medium to low education level. While in the category of underweight toddlers, 11.4% of the toddlers had parents with high education level, 88.6% of them had parents with medium to low education level [16]. The mother's education level influences the awareness of nutrition. Those who have good education level are more knowledgeable on the practice of child care [17-20]. The mother's education level is one of the factors relating to stunting, wasting, and underweight [21].

The average score of dental caries of stunting and underweight toddlers showed high category. This is in line with the study by Dimaisip-Nabuab et al. [22] stating that stunting and underweight toddlers suffered high category of primary dental caries that was untreated properly. Malnutrition among children completed with the deficiency of calcium, phosphate, vitamin A, C, and D, can increase one's vulnerability to the dental caries through three mechanisms, namely defect in tooth formation (odontogenesis), delayed tooth eruption, and change in tooth and salivary gland formation. There is a correlation between infection in oral cavity and toddler growth failure. One of the infection problems in oral cavity is dental caries [23].

Another thing also takes a role in the increased dental caries on stunting and undernutrition toddlers. It is a culture, in which culture influences the practice of child feeding. Pandhalungan ethnicity is an acculturation and assimilation between Madura and Java ethnicity. Madura places a dominant ethnicity and is located in the north of Jember regency [24]. Pandhalungan community believes that eggs can cause maag. The toddlers are suggested to eat more rice with less vegetables and side dishes. Their parents also believe that formula milk can replace breastmilk. In addition, there is a Madurese habit to feed the infants under 6 months with *lotek* (smashed rice with banana) to make them fat or having sufficient weight [25].

Underweight dan stunting in toddlers is also associated with oral health disorders, such as enamel defects. Enamel defects are a group of disorders that include enamel hypoplasia, hypomineralized second molar/molar incisor hypomineralization, amelogenesis imperfect, and fluorosis. Enamel hypoplasia is associated with malnutrition, due to the disturbance of ameloblastic activity during the secretory phase of amelogenesis. The severity of the insult determines the extent of the defect and the translucency of partially formed enamel. Moderate and acute malnutrition are likely to disturb ameloblastic activity [26-28].

There was no difference between dental caries of stunting and underweight toddlers, in which both showed high category of dental caries. Stunting and underweight are kinds of undernutrition affecting tooth formation because in cell growth, it leads the growth of hypoplastic enamel which makes one more vulnerable to the dental caries [29]. The hypoplastic enamel affected by malnutrition causes the formation of special space that eases plaque retention. Malnutrition causes salivary gland hypofunction that can decrease the flow of saliva, buffer capacity, and saliva composition that also leads dental caries [30]. In a normal condition, saliva is functioned as the cleaner of tooth surface from the pile of food residue. Consequently, the dental and oral health are good. In the case of chronic malnutrition, the flow of saliva tends to decrease that causes disorder in saliva in oral cavity.

This case can reduce the ability of oral cavity to restrain infection and buffer capacity from the plaque that contacts to the dental caries [30,31].

CONCLUSION

Based on the result of the study, it is concluded that there was no difference between dental caries of stunting and underweight toddlers among Pandhalungan community. Both of the stunting and underweight toddlers were in high-categorised caries.

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Author's Contributions

RWEY: Conceptualization, Methodology, Formal Analysis, Investigation, Writing – Original Draft Preparation, Project Administration, Validation, Data Curation, Resources, Writing – Review & Editing, Supervision, Funding Acquisition. K: Conceptualization, Methodology, Investigation, Writing – Original Draft, Project Administration, Software, Validation, Resources, Writing – Review & Editing, Supervision. SD: Methodology, Formal Analysis, Investigation, Visualization, Data Curation, Software, Resources, Writing – Review & Editing.

Conflict of Interest

The authors have no proprietary, financial, or other personal interest of any nature or kind in any product, service, and/or company that is presented in this article.

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Regulatory Statement

This study was conducted in accordance with all the provisions of the local human subject's oversight committee guidelines and policies of: The Research Ethic Committee Faculty of Dentistry University of Jember. The approval code for this study is: 1600/UN25.8/KEPK/DL/2022.

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