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The Association Between Maternal Nutritional Status During Pregnancy and Delayed Primary Tooth Eruption in Stunted Toddlers

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ABSTRACT Nutritional status during pregnancy is important for fetal development. Poor maternal nutritional status can cause delayed eruption of primary teeth in toddlers. This study was conducted because it was found that 6 out of 10 stunted toddlers who underwent dental examinations had delayed tooth eruption. This study aimed to investigate any potential associations between the pregnant women's nutritional status and the toddler's teeth who experience delayed eruption. This research is retrospective analytic. The total sample was 78 respondents, taken by purposive sampling method. The first visit of the Maternal and Child Health (KIA) book utilizing the Body Mass Index (BMI) to evaluate nutritional status of expectant mothers. Tooth eruption in toddlers was measured through dental examination. The analysis used was the Spearman correlation test. The findings indicated that most of mothers of toddlers during pregnancy had a nutritional status between 18.5-24.9 kg/m^2 or fell into the typical group (52.6%), but from the results of dental eruption examination it was found that most of the stunted toddlers experienced delayed tooth eruption (66.7%). The conclusion of the study is that the pregnant women's nutritional status is connected to the primary teeth's eruption in stunted toddlers with $\rho = 0.035$ ($p<0.05$). This study has implications for the importance of paying attention to pregnant women's dietary consumption in an attempt to avoid delayed tooth eruption in stunted toddlers.

INDEX TERM nutritional status, dental eruption, stunting

I. INTRODUCTION

Nutritional status is the balance between nutrient intake and the amount required by the body to perform biological functions [1]. Nutritional status has a major effect on the growth and development of kids younger than five years old, which is determined by sex, age, and height throughout the initial 1000 days of life (HPK). Stunting is a condition of toddlers who experience persistent malnutrition as a result of inadequate food intake resulting in shorter stature compared to toddlers of the same age and sex [2].

According to the Indonesian Ministry of Health in 2020, toddlers can be said to be stunted if the results of measuring height-based nutritional status divided by age (TB/U) are included in the classifications of short and extremely short with a threshold of less than -2 standard defiation (<-2SD) [3]. Based on the results of the 2018 Riskesdas, the prevalence of nutritional status (TB/U) in toddlers aged 0-59 months in Indonesia with a short category of 19.3% and very short 11.5%. East Java Province has a percentage of stunting toddlers reaching 33.6% which is the total of the short and very short categories [4]. Based on guidelines from the World Health Organization (WHO), if the frequency of stunted toddlers is less than 20% and underweight toddlers is less than 5%, then the area is included in the good category.

Jember Regency has a stunting prevalence of 34.9% [5] which indicates that Jember Regency is categorized as having a chronic community nutrition problem. Stunting can occur because the pregnant women's nutritional status falls into the poor category [6], so that nutritional reserves are

inadequate and the supply of nutrients to the fetus is reduced [7]. In addition to having an impact on the learning ability and immune system of toddlers [8], stunting also has an impact on the condition of the oral cavity, one of which is the delay in tooth eruption [9].

Toddlers' delayed tooth eruption can be caused by a number of things, such as race, gender, systemic conditions, environmental conditions, socio-economic level, maternal nutritional status, nutritional status of toddlers, and physical development of toddlers. Among these factors, one factor that can be changed and controlled is the pregnant women's nutritional status [10]. The occurrence of nutritional deficiencies, especially in calcium and phosphorus minerals and vitamin D needed by the fetus for bone formation can cause disturbances in the process of preparing the tooth structure [11], which will make toddlers experience delays in tooth eruption [12]. Within normal limits, the first primary teeth have the possibility of not appearing until the toddler is 1 year old, if more than that then the eruption is said to be delayed [13]. The results of the initial examination connected to the primary teeth eruption in stunted toddlers found that 60% of toddlers experienced delayed tooth eruption.

Delayed tooth eruption has a negative influence on the health and development process of toddlers, namely not maximizing the function of the teeth. Teeth have the main function to help the mastication process, which when experiencing delays in eruption causes toddlers to have difficulty chewing solid food so that nutritional intake is not fulfilled according to their age needs. In addition, delayed tooth eruption will also affect the physical and mental development of toddlers due to differences from toddlers of the same age, which affects self-confidence in social interactions [13].

With the factors that show that pregnant women's nutrition status affects the incidence of delayed tooth eruption, it's essential to conduct study related to the relationship between factors that affect tooth eruption, which in this study is limited to factors of pregnancy nutritional status with tooth eruption in stunted toddlers at Umbulsari Public Health Center, because stunted infants' delayed teeth eruption and the mother's nutritional state during pregnancy will create a deteriorative loop of continual decline.

II. METHODS

In January 2024, this study was carried out at the Umbulsari Public Health Center. This study is a bivariate correlation analytic with retrospective methodology with a total population of 162 people. Mothers of stunted toddlers between the ages of 24 and 52 months made up the study's sample who were taken from the population by purposive sampling method. To identify the history of pregnancy nutritional status of toddler's mother, observation and calculation of Body Mass Index (BMI) of the first visit in the Maternal and Child Health (KIA) book. Meanwhile, to determine the eruption of primary teeth of toddlers is done by examining tooth eruption.

To obtain research data, the techniques used are send Bankesbangpol Jember Regency a research proposal. On the suggestion of Bankesbangpol Jember Regency, request permission to conduct the research from the Jember Regency Health Office. Asking the Umbulsari Public Health Center's director for permission to conduct research with the Jember District Health Office's clearance. Working with regional cadres and midwives to enable participation in the posyandu. Asking the local midwife or a cadre at the posyandu for a list of the toddlers who are coming in. Examining the KIA book or cadres' data on stunting toddlers for information on the age and nutritional condition of toddlers attending the posyandu. If the toddler's nutritional status is "stunted" and it falls between 24 and 52 months of age, then provide the respondent a brief explanation of the study's goal and methodology. If the responder consents, then Informed Consent is given as proof of approval, and a dental examination is conducted by examining the appearance of the teeth in the respondent's toddler's oral cavity. Information on the findings of a single study-period examination of tooth eruption was recorded on the examination sheet. Noting the respondent's height, weight, and/or BMI during the initial visit in the KIA book or maternal cohort book throughout their pregnancy on the observation sheet.

Data analysis of data collection results utilizing the test of Spearman correlation. The ethical review for this study was completed and approved by Poltekkes Kemenkes Surabaya under the reference EA/2251/KEPK-Poltekkes_Sby/V/2024.

III. RESULTS

Demographically, the population in the Umbulsari Public Health Center working area reaches 42,174, consisting of 21,449 men and 20,725 women. The education level of the population in the Umbulsari Public Health Center working area is mostly not in school or not graduated from elementary school with most of them working as farm laborers. In their daily lives, most residents use water sources from shallow wells and use motorbikes as the main transportation. In the working area of Umbulsari Public Health Center, there are 1 main health center, 2 auxiliary health centers (Pustu), 1 village maternity clinic (Polindes), 2 village health centers (Ponkesdes), and 1 mobile health center that can be utilized by the population as an effort to improve health status in the community. Nevertheless, the most common disease patterns experienced by the population at Puskesmas Umbulsari were found, including

hypertension (HT), Acute Respiratory Infection (ARI), headache (cephalgia/headache), and other diseases. headache (cephalgia/headache), high fever (febris), pulp tissue disease (pulpitis), muscle pain (myalgia), type II diabetes mellitus (DM II), cough, gastrointestinal disorders (dyspepsia) and paranoid schizophrenia. This indicates that the social status of the population in the Umbulsari Public Health Center working area is low.

TABLE 1
Respondent Characteristics

Characteristics	Frequencies (n)	Percentages (%)
Mother's Age when Pregnant		
Younger than 18 years of age	0	0
18 to 23 years of age	36	46.2
24 to 29 years of age	29	37.2
30 to 35 years of age	11	14.1
Older than 36 years of age	2	2.6
Mother's Latest Education		
Primary education (SD)	22	28.2
Secondary education (SMP)	31	39.7
Senior high school (SMA)	25	32.1
University	0	0
Gender of Stunting Toddlers		
Boy	40	51.3
Girl	38	48.7
Age of Stunting Toddlers		
Less than 24 months	0	0
Between 24 and 30 months	15	19.2
Between 31 and 36 months	20	25.6
Between 37 and 43 months	24	30.8
Between 44 and 49 months	11	14.1
Greater than 50 months	8	10.3
Nutritional Status of Stunting Toddlers		
Short (-3 SD s/d < -2 SD)	59	75.6
Very Short (< -3 SD)	19	24.4

TABEL 1 shows that most mothers of stunted toddlers during pregnancy were aged 18-23 years with the most recent education at the junior high school level. The number of male stunted toddlers is more than female stunted toddlers with the highest age range of 37-43 months and are in the short category in the nutritional status of stunting toddlers.

TABLE 2
Nutritional status of mothers of stunted toddlers during pregnancy

Nutritional Status Of Mothers Of Toddlers During Pregnancy	Frequencies (n)	Percentages (%)
< 18,5 kg/m^2	20	25,6
18,5 – 24,9 kg/m^2	41	52,6
25 – 29,9 kg/m^2	11	14,1
> 30 kg/m^2	6	7,7
Total	78	100

From the purposive sampling method, 78 samples were obtained that met all the predetermined inclusion criteria, namely mothers who have toddlers in the age range of 24-52 months, mothers who bring toddlers to visit Posyandu, mothers who have toddlers with stunting nutritional status, and parents willing to become respondents.

TABLE 2 shows that the nutritional status of most mothers of toddlers is stunted during pregnancy based on BMI between 18.5-24.9 kg/m^2 falling under the typical categories.

TABLE 3
Eruption of Primary Teeth in Stunted Toddlers

Eruption of Primary Teeth in Stunted Toddlers	Frequencies (n)	Percentages (%)
Normal Eruption	26	33.3
Delayed Eruption	52	66.7
Total	78	100

TABLE 3 shows that the majority of stunted toddlers experience delayed tooth eruption.

TABLE 4
Data Analysis Results Using Spearman Correlation Test

Variable	r	ρ	n
Nutritional Status of Mothers with Stunted Toddlers based on BMI during Pregnancy	-0.239	0.035	78
Eruption Of Primary Teeth In Stunted Toddlers Aged 24-52 Months			

It is apparent from TABLE 4 that the outcomes of the Spearman correlation test from 78 respondents (n) obtained a ρ value (0.035) < α (0.05) with a correlation coefficient (r) -0.239 so it may be stating the Expectant Mom's Nutritional Sstatus and Teeth Eruption in Stunted Toddlers at Umbulsari Public Health Center in 2024 are related. So H_1 is accepted while H_0 is rejected.

IV. DISCUSSION

Maternal nutritional status refers to the balance of nutritional intake and the mother's body needs for metabolic processes which increase during pregnancy [1]. If nutritional needs are not met, it will make the mother vulnerable to experiencing nutritional problems [14]. BMI is one of the parameters of maternal nutritional status which is obtained by calculating body weight and height during pregnancy [6]. The pregnant women's nutritional status is influenced by several factors, such as eating patterns which are influenced by education which determines the mother's knowledge in choosing a variety of foods to meet nutritional needs [15] and good personal hygiene to maintain the mother's health and prevent the possibility of infectious diseases [16]. Research conducted by Liliandriani and Negsi [17] states that lack of consumption of healthy food and infectious diseases can have an effect on the nutritional status of the expectant mother. Likewise, Aisah et al. [18] stated that poor personal hygiene can cause infectious diseases and thus affect the nutritional status of expectant mothers. Nutritional status of expectant mothers involves the mother's overall

health which can influence fetal growth, including the influence on how the fetus's teeth form. Additionally, when teeth emerge might serve as a predictor of the pregnancy nutritional status [19].

Tooth eruption is the process by which a tooth emerges into the oral cavity from the alveolar bone [12]. Primary teeth in toddlers will begin to erupt between the ages of 4-9 months and mostly at the age of 6 months [20]. If up to 1 year old the toddler still does not see any teeth emerging from the gums, it could mean that the toddler is experiencing delayed tooth eruption [21]. A number of variables, including race, gender, systemic conditions, environmental factors, socio-economic situation, pregnant women's nutritional status, nutritional status of toddlers, and physical development of toddlers, might affect the likelihood of delayed teeth eruption [10]. Likewise with Huaying's et al. research [19], that differences in race, gender, environment, maternal nutritional status during pregnancy, nutritional status of toddlers, and socio-economic situation can determine the timing of primary teeth eruption in toddlers. This shows that the occurrence of tooth eruption in toddlers is multifactorial.

The findings from the examination of study data between the pregnant women's nutritional status based on BMI, most of which have a nutritional status between 18.5-24.9 kg/m^2 which is the typical category [22] with tooth eruption in stunted toddlers at Umbulsari Public Health Center Jember in 2024, most of whom experienced delayed tooth eruption, indicated that tooth eruption in stunted toddlers between the ages of 24-52 months was correlated with the status of expectant mothers nutrition. This shows that even though the status of expectant mothers nutrition is in the typical group, the child born still has the possibility of experiencing delayed tooth eruption, which indicates that the better the status of expectant mothers nutrition as determined by her BMI will reduce the possibility of delayed tooth eruption in toddlers without ignoring that there are other influencing factors that have a stronger relationship and are the main factors causing delays when the primary teeth erupt in stunted toddlers, such as the toddler's nutritional status and the toddler's physical development. The research done by Zulkarnain et al. [23] mentioned that which shows as compared to children without stunting, children with stunting had a greater risk of delayed tooth eruption. Systemic conditions, environmental conditions, socio-economic level and physical development in toddlers also have the same possibility of being the cause of delayed tooth eruption in stunted toddlers. As in Castro et al. [10], tooth eruption in toddlers can be influenced by many factors including systemic conditions, environmental conditions, socio-economic level, and physical development in toddlers.

This research still has many shortcomings. This research is limited by a relatively short time period and limited location within the Umbulsari Public Health Center's operating area, which may limit the generalization of research results to a wider population. The use of a purposive method in this study may cause selection bias, so the study results may not be fully representative of the wider population. Reliance on historical data from nutritional status records of pregnant women may have limitations in accuracy and completeness, potentially affecting the validity of analysis results. The sample size used in this study was relatively small and limited, which may not adequately represent a larger and more diverse population. This study only considered the variables nutritional status and tooth eruption, while other factors that might influence the results such as genetics or the child's general health condition were not included in the analysis. Based on these things, further research is needed.

In addition to being helpful from an academic standpoint, this study directly and significantly improves public health and wellbeing. This discovery has the potential to impact many facets of life, including public health policy and individual health, by offering scientific proof of the critical role plays nutrition during pregnancy. But, this research has significant implications, especially in the context of public health and dental interventions. The study's findings suggest that pregnant women's nutritional status has an important impact on the development of tooth eruption in stunted toddlers. These findings underline the need for health programs that are more focused on improving the pregnant women's nutritional status as a preventive measure against dental problems in children in the future. In addition, these results can be the basis for health policies at the Public Health Center and local government level to implement more effective and comprehensive nutrition education programs for pregnant women. In the long term, improving the nutritional status of pregnant women will not only reduce the prevalence of stunting, but also improve the quality of life and overall development of children. This research also opens up opportunities for further research that can develop other factors that influence tooth eruption and child development, so that the interventions carried out can be more comprehensive.

V. CONCLUSION

Identifying the history of nutritional status of mothers of stunting toddlers during pregnancy at the Umbulsari Jember Health Center in 2024. Being aware of teeth eruption in children who are stunted at Umbulsari Public Health Center in 2024. Examining the connection between stunted infants' teeth eruption and pregnant women's nutritional status at Umbulsari Public Health Center in 2024. Pregnant women are expected to conduct routine pregnancy checks, consume blood supplement tablets regularly, and drink pregnant women's milk to meet nutritional needs during pregnancy.

This study highlights the importance of proper nutrition during pregnancy and the first 1000 HPK to prevent stunting and delayed tooth eruption in children under five. Although most mothers of stunted children have a normal BMI, the quality of nutrition intake is still crucial. Therefore, nutrition intervention programs should focus on maternal nutrition, nutrition education, and regular health and dental check-ups. This integrated approach requires collaboration between health workers, nutritionists and community health extension workers to enhance the moms' and kids' nutritional status and prevent developmental problems in children under five.

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