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History of Anemia in Pregnancy with Stunting Incidents in Toddlers at Nipah Community Health Center, Malaka, North Lombok Regency

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Abstract: Stunting is a chronic nutritional problem whose incidence is quite high in Indonesia. Efforts to prevent and reduce stunting rates must involve all parties comprehensively. The process of stunting starts from pre-conception when a teenager becomes a mother who is malnourished and anemic. In Indonesia, 37.1% of women of childbearing age suffer from anemia. Several studies report that there is a relationship between anemia in pregnancy and the incidence of stunting in toddlers, however similar research is still rarely carried out in West Nusa Tenggara (NTB). This study aims to determine the relationship between a history of anemia in pregnant women and the incidence of stunting in toddlers at the Nipah Community Health Center, Malaka, North Lombok Regency (KLU). This research is an observational analytical survey research with a case control design. There were 69 samples in the case group (stunted toddlers) and 69 samples in the control group (normal toddlers). The results showed that there were 101 mothers (73.2%) with normal Hb levels, 24 mothers (17.4%) with mild anemia and 13 mothers (9.4%) with moderate anemia. Overall, 37 mothers (26.8%) suffered from anemia. The conclusion of this study is that there is no significant relationship between a history of anemia in pregnancy and the incidence of stunting in toddlers with a *p* value of 0.842. Obtaining an odds ratio value of 1 means that mothers who experience anemia during pregnancy have no risk of having stunted children. Anemia during pregnancy, parental income, education level and mother's employment simultaneously influence the stunting variable by 14.9%.

Keywords: Anemia; Coastal Coast; Short Pregnant Women; Stunting; Toddler

Introduction

Stunting is a nutritional problem whose incidence is quite high in Indonesia. It is important to pay attention to this because it affects the quality of Indonesia's human resources in the future. Efforts to prevent and reduce stunting rates must involve all parties comprehensively. Based on data from the World Health Organization (WHO), Indonesia is in third place with the highest rate of stunting in the Southeast Asia region, with an average prevalence of stunted toddlers of 36.5% in 2005 – 2017 (Kementrian Kesehatan RI, 2007; Kementrian Kesehatan RI, 2010; Kementrian Kesehatan RI, 2013; Kementrian Kesehatan RI, 2018a). The results of the 2018 Basic Health Research (Riskesdas) show the prevalence of short toddlers (stunting) in Indonesia is 30.8%. The prevalence of stunting in West Nusa Tenggara Province alone is 33.5%, higher than the national average (Dinas Kesehatan NTB, 2017; Kementrian Kesehatan RI, 2018b).

The occurrence of stunting can be caused by many factors, including socio-economic conditions, maternal nutrition during pregnancy, pain in the baby and lack of nutritional intake in the baby (Kementrian Kesehatan RI, 2019). The process of stunting starts from pre-conception

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when a teenager becomes a mother who is malnourished and anemic. This will get worse if during pregnancy the mother's nutritional intake is not sufficient to meet her needs, especially when the mother lives in an environment with inadequate sanitation. In Indonesia, there are 37.1% of women of childbearing age (WUS) who suffer from anemia (Atmarita, 2018).

Pregnant women are included in a group that is vulnerable to anemia (Evelyn, 2009). During pregnancy, plasma volume increases (Hoffbrand and Moss, 2011). If the increase in erythrocyte volume is not proportional to the increase in plasma volume, it will cause a decrease in hemoglobin concentration, this is what underlies anemia in pregnancy (McLean et al., 2009; Wibowo et al., 2021). Nutritional intake greatly influences the risk of anemia in pregnant women. Insufficient iron intake during pregnancy can affect fetal growth which can result in stunted fetal growth, low birth weight (LBW), preterm birth, stillbirth, and infant death in the first week of birth (Thompson et al., 2011). The recommended iron nutritional adequacy from the Ministry of Health for women aged 19-49 years is 26 mg/day. In the 1st trimester of pregnancy the need is the same as before pregnancy, in the 2nd trimester the need increases by 9 mg from the initial need and in the 3rd trimester the need increases by 13 mg (Menteri Kesehatan Republik Indonesia, 2013). For this reason, it is important for pregnant women to regularly consume blood supplement tablets (Wang et al., 2016).

Maternal nutrition plays an important role in fetal growth, infant health and survival as well as long-term child health and development (Black et al., 2013). During the crucial period in the first half of the 1000 days of life (from conception to 6 months), the mother is the only source of nutrition for the child's development; first in the womb and then during the first 6 months of life when exclusive breastfeeding is recommended (Mason et al., 2014).

Several studies report that there is a relationship between anemia in pregnancy and the incidence of stunting in toddlers. Research conducted in Gayam village, Gurah subdistrict, Kediri district reported that there was a relationship between a history of anemia during pregnancy and the incidence of stunting (Rahayu, 2021). In a similar study, it was found that there was a significant relationship between the history of pregnancy anemia and the incidence of stunting among toddlers in Ketandan village, Dagangan, Madiun. Pregnant women who suffer from anemia have a 4 times higher risk of stunting in children compared to mothers who are not anemic (Widyaningrum & Romadhoni, 2018). Likewise, research conducted at the Kampar Health Center work unit, Kampar Regency obtained similar results (Hastuty, 2020). However, research conducted in Mamuju, West Sulawesi reported that there was no relationship between Hb levels in pregnant women and the incidence of stunting (Royani et al., 2021).

However, not many studies have examined the relationship between a history of anemia in pregnant women and the incidence of stunting in toddlers who live around the coast. So this research aims to determine the relationship between a history of anemia in pregnant women and the incidence of stunting in coastal toddlers at the Nipah Community Health Center, Malaka, KLU.

Method

This research is an observational analytical survey research with a case control design carried out at the Nipah Community Health Center, Malaka, North Lombok Regency, NTB. This research was carried out in May-November 2022. The target population in this research were toddlers and mothers in the work area of the Nipah Community Health Center, Malaka, North Lombok Regency. There were 69 samples in the case group (stunted toddlers) and 69 samples in the control group (normal toddlers). The sampling technique in this research was carried out by purposive sampling from the existing population (Dahlan, 2011). The inclusion criteria are stunted toddlers aged 6-59 months who have had their nutritional status checked with the TB/U index and live in the working area of the Nipah health center, toddlers born at term, parents willing to take part in the research. Mother with the hemoglobin level < 11 mg/dl classified as anemic (World Health Organization, 2001; World Health Organization, 2011a; World Health Organization, 2011b). The exclusion criteria are toddlers have physical abnormalities related to legs and height.

Data were processed using the Statistical Package for Social Sciences (SPSS) version 26. The data analysis used was univariate and bivariate analysis. Bivariate analysis was carried out after univariate calculations. The statistical test used is Ordinal Multiple Regression, namely a regression test on the dependent variable that uses data on an ordinal scale, with interpretation using a p-value of 0.05 with a precision of 5%, so it is said to be related if the p-value ≤ 0.05 if more is considered not related. Then proceed with the OR (odds ratio) test, namely using a 2 x 2 table to obtain the prevalence ratio obtained from the results of the analysis of the relationship between anemia and the incidence of stunting.

This study has been revised, approved, and has received ethical clearance by the Ethical Research Committee of Mataram University with approval number 233/UN.18.F7/ ETIK/2022.

Result and Discussion

Of the 138 respondents who met the inclusion and exclusion criteria, 68 (49.3%) of the toddlers were boys and 70 (50.7%) were girls. In the sample of male toddlers the average age was 36.45 months and in the sample of female toddlers the average age was 37 months. The average age of the entire sample was 36.71 months. The youngest toddler is 9 months and the oldest is 58 months. The sample frequency distribution is listed in Table 1.

Table 1. Sample Frequency Distribution Based on Gender and Average Age

Gender	Amount (%)	Average age (months)
Male	68 (49.3)	36.45
Female	70 (50.7)	37.00
Total	138 (100)	36.71

Sample Frequency Distribution based on Residence and Average Age

Table 2. Sample Frequency Distribution

Hamlet	Amount	Percentage (%)	Average Age
Kecinan	29	21.01	27.97
Mentigi	34	26.56	30.53
Nipah	9	6.52	27.33
Pandanan	30	21.74	29.03
Setangi	27	19.56	25.89
Telok Kodek	9	6.53	31.78
Total	138	100	28.63

Based on the distribution of residence, respondents lived in the hamlets: 29 people in Kecinan, 34 people in Mentigi, 9 people in Nipah, 30 people in Pandanan, 27 people in Setangi, 9 people in Telok Kodek with the average age of mothers in the hamlet being: 27.97 years, 30.53 years, 27.33 years, 29.03 years, 25.89 years, and 31.78 years. The average age of the entire sample was 28.63 years. The distribution of residence and average maternal age can be seen in Table 2.

Frequency Distribution of Children's Nutritional Status and Hb Levels, Income, Latest Education and Mother's Occupation

Based on nutritional status (TB/U), 69 children with normal criteria were found (50%), 54 were stunted (39.1%) and 15 were severely stunted (10.9%). Based on the mother's Hb level during pregnancy; There were 101 mothers with normal Hb levels (73.2%), 24 people with mild anemia (17.4%) and 13 people with moderate anemia (9.4%). From this data, it was found that 101 people (73.2%) had normal Hb levels and 37 people (26.8%) suffered from anemia. The parent's income is mostly in the range of Rp. 500,000 – 1,000,000, namely 54 people (39.1%), following their parents' income of between Rp. 1,000,000 – 2,500,000 as many as 37 people (26.8%), < Rp. 500,000 as many as 36 people (26.1%) and in last place are parents with an income of Rp. 2,500,000 – 5,000,000 as many as 11 people (8%).

For the level of maternal education, 56 mothers with high school or equivalent education were found (40.6%), 41 people with junior high school or equivalent education, 30 people with elementary school education (21.7%), 6 people with no school (4.3%) and 5 undergraduates (3.6%). The nutritional status of toddlers, mother's Hb level during pregnancy, parents' income and mother's latest education are shown in Table 3.

Table 3. Frequency Distribution of Children's Nutritional Status and Hb Levels, Income, Latest Education and Mother's Occupation

Criteria	Distribution	N	%
Nutritional Status (TB/U)	Normal	69	50.0
	Stunted	54	39.1
	Severely stunted	15	10.9
Hb level	Normal	101	73.2
	Mild anemia	24	17.4
	Moderate Anemia	13	9.4
Income	< Rp. 500,000	36	26.1
	Rp. 500,000 – 1,000,000	54	39.1
	Rp. 1,000,000 – 2,500,000	37	26.8
	Rp. 2,500,000 – 5,000,000	11	8.0
Last education	No school	6	4.3
	Elementary school	30	21.7
	Junior high school	41	29.7
	Senior high school	56	40.6
	S1 (Bachelor)	5	3.6
Job	Self-employed	5	3.62
	Farmer	1	0.72
	Fisherman	3	2.17

Teacher	3	2.17
Housewife	122	88.4
Laborer	3	2.17
Cadre	1	0.72
Total	138	100

Bivariate Analysis

In this study there were four independent variables, namely the incidence of anemia, education and maternal employment, as well as total parental income, and one dependent variable, namely the nutritional status of toddlers. The data obtained in this study was tested for odds ratio using the Mantel-Haenszel Common Odds Ratio Estimate test with an OR value of 0.923 and a *p*-value of 0.842 (*p*-value > 0.05, not significant). Next, a multiple ordinal regression test was carried out. From the results of the Nagelkerke test, it was found that the coefficient of determination (Pseudo R Square) was 0.149 (14.9%), meaning that the independent variables (anemia, income, education level and mother's occupation) simultaneously (together) had an effect on the stunting variable by 14 .9%.

Based on data on hemoglobin levels during pregnancy in mothers, the highest results were obtained in the normal category with 101 samples (73.2%), mild anemia in 24 people (17.4%) and moderate anemia in 13 people (9.4%), none of the mothers had suffer from severe anemia. The total number of pregnant women suffering from anemia was 37 people (26.8%). The prevalence of anemia in pregnancy in this study was lower than the proportion of anemia in pregnant women in the 2013 Riskesdas of 37.1% and in the 2018 Riskesdas of 48.9% (Kementrian Kesehatan RI, 2018a). The results in this study were also lower than the results in a study conducted in Ambon, Maluku with an incidence of anemia in pregnant women of 50.3% (Asmin et al., 2021).

Odd Ratio Test

Based on the incidence of anemia during pregnancy in the group of children with normal nutrition, it was found that 52 mothers (37.7%) had normal Hb levels and 17 mothers (12.3%) had anemia. In the group of stunted children, 53 mothers (38.4%) had normal Hb levels and 16 mothers (11.6%). The distribution of the frequency of anemia in pregnancy in the stunting and normal groups can be seen in Table 4.

Table 4. Frequency Distribution of Anemia in Pregnancy

		Hemoglobin levels		
		Normal	Anemia	Total
Nutritional status	Normal	52	17	69
	Stunting	53	16	69
Total		105	33	138

Based on the OR value, it is shown by the "Estimate" value, namely 0.923 (can be rounded to 1). This value explains that mothers with a history of anemia have no risk of having stunted children. Asymp value. Sig (2-Sided) shows the *p*-value or significance of the OR value. If the *p*-value is < 0.05 at the 95% confidence level, the OR is declared significant or significant, which means it can represent the entire population. However, in this research data the Asymp value. Sig (2-Sided) > 0.05, namely 0.842, so the OR is not significant.

Multiple Ordinal Regression Test

After carrying out the Multiple Ordinal Regression test, the Nagelkerke Test was first carried out. From the results of the Nagelkerke test, it was found that the coefficient of determination (*Pseudo R Square*) was 0.149 (14.9%) which means that the independent variables (anemia in pregnancy, parental income, education level and mother's occupation) simultaneously had an effect on the stunting variable of 14.9 %. In the Wald Test, respondents were found in the income group of Rp. 1,000,000–2,500,000 (income number 3) has *p* 0.034 (< 0.05), the last education variable has *p* 0.000 (< 0.05). This shows that the last income and education variables have an influence on stunting. Meanwhile, for the variables anemia during pregnancy, employment and income (numbers 1, 2, 4) have *p* > 0.05. This shows that this variable has no effect on stunting.

Several previous studies reported a relationship between anemia in pregnancy and the incidence of stunting in toddlers (Nadhiroh et al., 2023; Widyaningrum & Romadhoni, 2018; Hastuty, 2020). In the results of this study, the odd ratio value was 1, this result can be interpreted as meaning that mothers with a history of anemia have no risk of having stunted children. This is similar to the results of research conducted in Mamuju, West Sulawesi. In research conducted by Royani et al. (2021), it was reported that there was no relationship between Hb levels in pregnant women and the incidence of stunting.

The absence of a relationship between anemia in pregnancy and the occurrence of stunting in toddlers born in this study could be caused by stunting in toddlers can occur due to many other factors besides anemia during pregnancy such as maternal nutritional intake during pregnancy, sanitation and availability of clean water and also the status of maternal nutrition during pregnancy (Young et al., 2018). After the baby is

born, other factors such as breastfeeding and the baby's nutritional intake influence the incidence of stunting (Mason et al., 2014; Young et al., 2018). Several studies have also found that stunting in children is associated with low intake of food, protein, amino acids, calcium and vitamin D (Angelin et al., 2021; Setiawan, 2006; Correa-Rodríguez et al., 2016; Semba et al., 2016).

Conclusion

There is no relationship between the incidence of anemia in pregnancy and the incidence of stunting in toddlers with a *p* value of 0.842. With an odds ratio value of 1, it can be concluded that mothers who experience anemia during pregnancy have no risk of having stunted children. Anemia during pregnancy, parental income, education level and mother's employment simultaneously influence the stunting variable by 14.9%.

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Conceptualization, R. C.; Methodology, R. C.; Validation, A. D., and R. D. A.; Formal analysis, D. R.; Investigation, R. C., and A. D.; Resources, R. D. A., and D. R.; Data curation, R. C.; Writing—original draft preparation, A. D., and R. D. A.; Writing—review and editing, R. C.; Visualization, D. R., and A. D. All authors have read and agreed to the published version of the manuscript.

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Conflicts of Interest
The author declares that there is no conflict of interest.

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