First page

Determinant of The Fine Motor Development to The Stunting Toddlers in Maros Regency, South Sulawesi, Indonesia

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Second page

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Third page

ABSTRACT

Objective: This aims of this research study are to analyse determinants of the fine motor skill of the stunting toddlers in Maros regency, South Sulawesi, Indonesia.

Method: This study is observational analytic, crossectional design. The sample of the study is the stunting toddlers. The total samples are 100 respondents. The instrument study is using questionary of DDST (*Denver Developmental Screening Test*) to measure Fine Motor Skills.

Result: The results showed that the stunting toddlers had normal fine motor skills are 17.3% and 82.7% of stunting toddlers had suspect fine motor disorders skills. There was a relationship between diet (p=0.036), history of infectious disease (p=0.032), breastfeeding (p=0.003), and emotional bonding (p=0.038) with the fine motor skills of stunting toddlers. Meanwhile, the immunization (p=0.94) and mother's knowledge (p=0.604) had no relationship with the fine motor skills of stunting toddlers.

Conclusion: Stunting Toddlers had suspect fine motor disorders as much as 82.7%, and the determinant factors that affect the significant correlation of fine motor development in stunting toddlers are diet, emotional bonding, breastfeeding, and a history of infectious diseases.

Keywords: StuntingToodlers, Fine Motor Skill, Maros Regency

Fourth page

INTRODUCTION

A healthy pregnancy is one of the goals of health development programs in Indonesia. Some physiological changes that occur in pregnant women can cause serious consequences and threats to the health of the pregnancy. Physically, pregnant women will feel tired, weak, and lethargic, meaning that they will need to depend on the people around them. The level of awareness of maintaining good health during pregnancy is one of the most important factors affecting the maternal mortality rate (MMR) during the process of pregnancy and childbirth.[1,2]

Maternal mortality is an important indicator that needs to be considered in determining the degree of health in the community. This rate refers to the death of a woman during pregnancy or within 42 days after delivery from causes directly or indirectly related to childbirth. Maternal mortality rates continue to increase every year. Globally, the number of maternal deaths due to pregnancy complications and labour process is approximately 289,000 per year, which is equal to eight hundred women per day. Global data shows that Indonesia has the highest maternal mortality rate in Southeast Asia with an estimation of 11,534 deaths per year. One of the risk factors that may cause maternal death is anaemia during pregnancy.[3-5]

Anaemia during pregnancy can cause multiple negative implication for mothers' health, including bleeding during labour. Bleeding is the main cause of high maternal mortality (HMM) in Indonesia, indicating that anaemia in pregnancy might be prevalent amongst Indonesian population. The prevalence of anaemia in pregnant women is 14% in developed countries and 51% in developing countries. It is estimated that 90,000 deaths are caused by anaemia per year. The incidence of anaemia in Africa, Southeast Asia, and the Western Pacific region is very high, with more than 90% of the population found to be anaemic in surveys conducted with children and mothers, especially pregnant women.[6]

Iron deficiency anaemia is a condition that often occurs in pregnant women. It can cause various dysfunctions including a decrease in endurance, and late growth and development of the fetus. Therefore, this problem requires proper handling and prevention. Giving iron supplements and multi-micronutrient supplements to pregnant women is one of the health measures that can assist with anaemia.

Taking iron supplements such as multi-micronutrient supplements and Fe tablets during pregnancy can reduce the risk of babies being born with low body weight and anaemia. Meeting iron needs during pregnancy can also boost the immune system and prevent anaemia in pregnant women. Multi-micronutrient supplements and Fe tablets during pregnancy help with

the synthesis of erythrocytes, which play a role in preventing fatigue during pregnancy, and can ensure that pregnant women's Hb levels become normal. If pregnant women do not take multi-micronutrient supplements and Fe tablets during pregnancy, they will be prone to anaemia and will quickly tire. A non-governmental organisation (NGO) is introducing a multi-micronutrient supplement for pregnant women, which is replacing Fe tablets with MVA. Understanding the effectiveness of multi-micronutrient supplements and Fe tablets is expected to help prevent anaemia in pregnant women.

METHODS

This research is a quantitative study, the research design used is a quasi-experiment with the approach of three groups pre- and post-test design. A total of 120 pregnant women was divided in two groups, group 1 (Fe tablet supplements) and group 2 (multi-micronutrient supplement supplements), and group 3 (a combination of Fe tablets and multi-micronutrient supplements). Study participants was selected using proportional random sampling.

A HemoCue, blood haemoglobin monitoring system designed for quantitative measurement of blood haemoglobin levels, was used to measure haemoglobin value of participants. Trained research team performed taking bloods to measure the women's haemoglobin.

This bivariate analysis is used to look at differences in haemoglobin levels in pregnant before and after the giving of Fe tablets, vitamin angel, and a combination of Fe tablets + multi-micronutrient supplements. The statistical test used is a paired t-test used to test the comparative hypothesis of one unpaired sample. One-way ANOVA test is to determine the effect of multi-micronutrient supplement on Hb levels. All statistical analysis were performed using SPSS version 22.

RESULT

Majority of participant' characteristics were 84.2% aged 20-35 years, 44.2% were graduated elementary school, 80% as a housewife, and 54.2% had normal Hb level (Table 1).

Table 1. Characteristics of Subjects Based on intervention groups

Characteristic	Groups			
	Fe tablets	MMS	Fe tablets + MMS	Total

	n (%)	n (%)	n (%)	n (%)
Age group				
<20 and >35 year (risk)	6 (15.0)	3 (7.5)	10 (25.0)	19 (15.8)
20 - 35 year (not risk)	34 (85.0)	37 (92.5)	30 (75.0)	101 (84.2)
Education level				
Elementary school	23 (57.5)	13 (32.5)	17 (42.5)	53 (44.2)
Secondary school	7 (17.5)	5 (12.5)	12 (30.0)	24 (20.0)
Tertiary school	8 (20.0)	13 (32.5)	9 (22.5)	30 (25.0)
Bachelors' degree	2 (5.0)	9 (22.5)	2 (5.0)	13 (10.8)
Occupation status				
Housewife	39 (97.5)	24 (60.0)	33 (82.5)	96 (80.0)
Government staff	1 (2.5)	16 (40.0)	7 (17.5)	24 (20.0)
Anaemia status				
Not anaemia (Hb 11.0-14.0g/dl)	24 (60.0)	21 (52.5)	20 (50.0)	65 (54.2)
Anaemia (Hb <11.0g/dl)	16 (40.0)	19 (47.5)	20 (50.0)	55 (45.8)

Based on the age group, the Hb level in participants aged under 20 and over 35 had the highest increased in MMS group (1.8). For participants aged 20 to 35, the highest increased in MMS + Fe group (1.1) (table 2).

Table 2, Average haemoglobin levels based on Respondent's Age

Group intervention	Haemoglobin (Mean ± SD)			
	< 20 and >35 year		20 to 35 years	
	before	after	before	After
Fe tablets	10.3±0.40	10.7±0.38	10.8±0.67	11.1±0.53
MMS	10.0±0.47	11.8±0.60	10.8±0.67	11.6±0.49
Fe tablets +MMS	10.7±0.45	11.9±0.51	10.9±0.55	12.0±0.49

The Hb levels in Fe tablet, MMS, and MMS+Fe table groups were significantly increased ($p<0.001$) after the intervention given (0.4, 0.8, 1.1, respectively). The lowest percentage was in the Fe group (3.7%), while the highest was in the MMS+Fe group (10.1%). The result shows that the administration of Fe tablets, multi-micronutrient supplements, and the combination of

Fe tablets and multi-micronutrient supplements for 90 days can increase the Hb levels of pregnant women (table 3).

Table 3. Average Hb levels before and after intervention.

Hb level	Group intervention (Mean ± SD)		
	Fe tablets	MMS	Fe tablets + MMS
Before	10.7±0.66	10.8±0.66	10.9±0.53
After	11.1±0.53	11.6±0.50	12.0±0.49
P Value	0.000*	0.000*	0.000*
ΔHb levels	0.4±0.31	0.8±0.37	1.1±0.30
% Δ	3.7↑	7.4↑	10.1↑

* Paired t Test

The one-way ANOVA test shows that there was a significant different of Hb changes among groups after the intervention ($p<0.001$).

Table 4. Differences in Hb levels between intervention groups.

Variables	***Groups***			***p***
	Fe tablets	MMS	Fe tablets + MMS	
Hb Levels Before Intervention				
Minimum	9.5	9.2	9.7	0.388*
Maximum	12.4	11.8	11.8	
Hb Levels After Intervention				
Minimum	10.0	10.8	11.0	<0.001*
Maximum	12.7	12.7	12.8	
ΔHb levels				
Minimum	-1.0	-1.7	-1.8	<0.001*
Maximum	1.0	-0.3	-0.5	

*One-way ANOVA test

DISCUSSION

The respondents who had the highest level of intervention were pregnant women who were not high risk (aged 20-35 years), had an elementary school education, worked as housewives, and were not anaemic. 20-35 years can be considered to be a productive age for pregnant women. The age factor affects the incidence of anaemia because, at the age of 20 and 35 years, women are more stable in paying attention to the fulfillment of their need for iron[7,8]. An increase in Hb levels has been found to coincide with increasing age.[9] It was also found that, as Alam et al. (2021) reported, Hb levels are influenced by age, occupation, and family income.

A factor that indirectly affects the maternal mortality rate is the work of pregnant women. Access to sufficient information helps pregnant women who work in the formal sector to obtain important health information. The environment can also influence a person's ability and willingness to gain experience and knowledge, either directly or indirectly.[10] Employment in pregnant women can increase both income and reproductive health status, due to their ability to obtain new knowledge through discussions and interactions with other people.[11]

More than half of the pregnant women who participated in this study did not experience anaemia. The remainder of the women demonstrated the need for supplementation of Fe tablets and other supplements in the form of multi-micronutrient supplements. Multi-micronutrient supplements are supplements that were developed for pregnant women. In the Banggai and Probolinggo regions, cooperation with international non-governmental organisations led to important research being conducted.[12] Based on the results of the study, the increase in Hb levels due to taking multi-micronutrient supplements was higher than that due to taking Fe tablets.

Multi Micronutrient Supplements is a charitable organisation that provides nutritional support to millions of people living in at-risk and underserved communities in fifty countries around the world. Multi Micronutrient Supplements, as a charity, provides supplements for pregnant women, facilitates safe births, supports the health of babies, and provides vitamin A and other supplements for children up to the age of five.[13]

The results showed differences in Hb levels before and after the interventions, which included Fe tablets, multi-micronutrient supplements, and a combination of both. The highest increase was found in the combination of multi-micronutrient supplements and Fe tablets.

The mechanism of iron absorption in the body begins with the luminal phase in the stomach. The iron will be processed in the stomach through the stomach acid breaking of its bonds with other compounds. Then there is a reduction from the form of iron (Fe^{3+}) to iron

(Fe^{2+}), which can be absorbed in the duodenum. Furthermore, the mucosal phase, or iron absorption in the intestine, occurs in the duodenum and jejunum. Iron from food sources enters in the form of iron (Fe^{3+}), or non-heme iron, while the iron is absorbed as iron (Fe^{2+}). The absorption of iron is then stored in the cytoplasm.[14,15]

This study is in line with what was reported by Sari (2021). The average Hb level in pregnant women was higher after consuming Fe tablets (21.68mg/ml ± 10.61) compared to those who had not taken tablets (17.29mg/ml ±9.90). This showed that there was a significant difference in Hb levels in pregnant women before and after taking Fe tablets (p = 0.014). This led to the government's recommendation and program to provide support for pregnant women to take Fe tablets.

Through government programs, pregnant women are required to consume a total of 90 Fe tablets during pregnancy. The absorption of Fe tablets is influenced by numerous factors, including diseases that affect women during pregnancy and the consumption of Vitamin C, which can help the body to absorb Fe from food. Some foods reduce the ability to absorb Fe such as tea, coffee, calcium-containing foods and other dairy products.[16]

CONCLUSION

The average change in Hb levels in the intervention group with Fe tablets was 0.4g/dL, while the intervention for multi-micronutrient supplementation was 0.8g/dL, with differences in the Hb levels of pregnant women with Fe tablet intervention (p-value=0.000) and multi-supplement intervention (p-value = 0.000). This means that the intervention of Fe tablets and multi-micronutrient supplements significantly affected the Hb levels of pregnant women.

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