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Milk Supplementation as a Potential Intervention for Overcoming Anemia and Chronic Energy Deficiency during Pregnancy

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ABSTRACT

This study aimed to determine the effect of milk supplementation on Mid-Upper Arm Circumference (MUAC) and hemoglobin level in pregnant women. It is a quasi-experimental study conducted from May to August 2019. The sampling was done by purposive sampling, and 108 pregnant women were recruited and divided into two groups: intervention group and non-intervention group. The intervention group received Fe-fortified milk supplementation, and the non-intervention group received education on anemia prevention. Data were analyzed using paired t-test. The result was that providing milk supplementation to pregnant women for three months could significantly increase MUAC and prevent further decline in hemoglobin levels.

Keywords: anemia, hemoglobin level, milk supplementation, pregnant women

INTRODUCTION

Among the problems faced by pregnant mothers in developing countries are Chronic Energy Deficiency (CED) and anemia. In 2018, the prevalence of CED among pregnant women in Indonesia was 17.3% and the prevalence of anemia was 48.9% (MoH RI 2018). Among the provinces in Indonesia, East Nusa Tenggara is the province with the highest rates of CED and anemia. This study aims to determine the effect of milk supplementation on Mid-Upper Arm Circumference (MUAC) and hemoglobin level in pregnant women.

METHODS

This quasi-experimental study was conducted at Naibonat, Oesao and Tarus Health Centers from June to September 2019. Purposive sampling was employed, and 108 recruited pregnant women were divided into two groups (intervention group with 54 anemic pregnant women and non-intervention group with 54 non-anemic pregnant women). The treatment for the intervention group was milk supplementation. The measured outcomes were hemoglobin (Hb) level and Mid-Upper Arm Circumference (MUAC). The intervention lasted three months, and food recalls were conducted at baseline and post-intervention. Paired t-tests were used to analyze differences in dietary intake between the intervention and non-intervention groups. Data were analyzed by comparing the differences between measurement different points. Pair 1 measured the difference between the baseline measurement and the measurement at one month, pair 2 measured the difference between the measurements at one month and at two months, and pair 3 measured the difference between the measurements at two months and at three months. The difference was calculated by subtracting the scores between measurements. Sixty-nine eligible pregnant women were separated for Regression Discontinuity Design (RDD) analysis, where intervention was not randomized but assigned to those below the anemia cutoff (<11 g/dL). The cutoff, intervention, and outcome of the RDD were clearly defined. All subjects of this study gave written informed consent. Ethical approval was obtained from the Institute of Research and Community Service, Atmajaya Catholic University (reference number 0617/III/LPPM-PM.10.05/05/2019, May 24, 2019).

RESULTS AND DISCUSSION

The results showed that although giving milk to pregnant women was not able to significantly increase hemoglobin levels, it

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did decrease the proportion of anemia by 3%, from 70.4% to 67.4%. The intervention group experienced an insignificant decrease in Hb levels compared to the non-intervention group, which experienced a significant decrease. This means that giving milk to pregnant women can prevent a decrease in hemoglobin levels and prevent an increase in the proportion of anemia. Table 1 shows that there was a significant decrease in the non-intervention group in the first phase of the study, but not in the intervention group.

There were significant increases in MUAC in both groups, so it is difficult to be certain that the increase was due to the effect of giving milk (Table 1). However, it is shown that in the intervention group there was a significant increase in intake of all nutrients compared to only energy and fat intake in the non-intervention group (Table 2).

From analysis using a regression discontinuity design based on hemoglobin levels (Syafiq *et al.* 2022), it was known that milk supplementation can significantly increase the MUAC of pregnant women by 4.69 cm. Although no discontinuity was found, the effect of milk supplementation on increasing hemoglobin level by 0.98 g/dL occurred and is important to note.

Table 1. Differences in the effects of milk supplementation on Hb levels and MUAC of pregnant women according to type of treatment and monitoring time

Group	Baseline	Pair 1 (Follow up 1 & baseline)	*p*	Pair 2 (Follow up 2 & follow up 1)	*p*	Pair 3 (Follow up 3 & follow up 2)	*p*
Hb level (g/dL)							
Intervention	10.0±1.7 (n=54)	0.056±1.72 (n=50)	0.820	0.112±1.09 (n=49)	0.477	0.043±1.58 (n=46)	0.853
Non-intervention	12.2±1.1 (n=54)	-0.981 (n=50)	0.0001*	-0.141 (n=43)	0.579	-0.184±1.31	0.395
MUAC (cm)							
Intervention	23.3±3.0 (n=54)	0.766±0.98 (n=50)	0.0001*	0.465±0.83 (n=49)	0.0001*	0.482±1.11 (n=46)	0.005*
Non-intervention	26.4±2.2 (n=54)	0.784±1.28 (n=50)	0.0001*	0.397±0.75 (n=43)	0.001*	0.536±1.02 (n=38)	0.003*

Paired t-test, p<0.05; Hb: Hemoglobin; MUAC: Mid-Upper Arm Circumference

Table 2. Analysis of nutrient intake in pregnant women by treatment group

Nutrient	Group					
	Intervention (n=46)			Non-intervention (n=38)		
	Baseline	Endline	*p*	Baseline	Endline	*p*
Energy (kcal)	1,303±500	1,720±621	0.0001*	1,372±616	1,741±956	0.013*
Carbohydrate (g)	188.6±75.9	228.6±95.5	0.010*	206.5±93.9	235.6±131.5	0.135
Protein (g)	46.8±20.9	69.2±35.3	0.0001*	51.0±30.0	59.8±33.7	0.049
Fat (g)	41.2±30.2	63.3±28.1	0.0001*	41.2±27.1	58.2±41.8	0.009*
Iron (mg)	6.4±3.8	11.5±4.2	0.0001*	6.9±4.3	8.2±5.3	0.519

*Paired t-test; Significant at p<0.05

CONCLUSION

It is concluded that three months of milk supplementation in pregnant women can significantly increase MUAC and prevent further decline in hemoglobin levels. However, the interpretation should also consider the possibility of different biological responses due to different baseline hemoglobin levels. Those who are deficient may respond better. Milk supplementation may be considered as an option to improve the nutritional status of pregnant women.

DECLARATION OF CONFLICT OF INTERESTS

The authors have no conflicts of interest to declare.

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