

Effect of *Moringa Oleifera* Leaf Extracts Supplementation in Preventing Maternal Anemia and Low-Birth-Weight

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Abstract- The extracts of *Moringa oleifera* leaf have been proven to have potent anti oxidant activity, prevent oxidative damage, and afford significant protection against oxidative damage. This study aims to assess the effect of *Moringa oleifera* leaf extracts supplementation in preventing maternal anemia and low-birth-weight (LBW). This was a double blind, randomized control trial study, pretest-posttest controlled which conducted in Gowa District, South Sulawesi Province, Indonesia, from September 2012 to December 2013. Subjects in this study are 64 pregnant women. The result of the study discovered significant increase of hemoglobin level in the intervention group ($p < 0.05$). *Moringa Oleifera* extract consumption increased the hemoglobin level to 58%. In the control group, the conformity of pregnant women has no significant effect to pregnant women hemoglobin level increase. *Moringa Oleifera* extract is able to retain ferritin serum level dismount up to 50%. LBW was not found in pregnant women who received *Moringa oleifera* leaf extract. Further research is needed to confirm the exact dose of *Moringa oleifera* leaf extracts.

Index Terms- *Moringa oleifera*, anemia, pregnant women, hemoglobin, ferritin, LBW.

I. INTRODUCTION

Effects caused by malnutrition can be particularly associated with the micronutrients insufficiency, are zinc and iron deficiency. Both micronutrients play important role in development of the foetus. Multiple risks might happen whenever pregnant women suffer from malnutrition, including maternal bleeding, abortus, birth death, low-birth-weight, congenital defect, mental retardation etc¹.

One of the main factor that might have harmful effect on foetus and the development of the newborn is pregnant women with anemia state, where the hemoglobin level in the blood below normal (≤ 11 gr/dl). This might be caused by deficiency of iron, folic acid or B12 vitamin. Maternal anemia could cause harmful effect both to mother and the foetus, because it reduces oxygen supply on mother metabolism since the hemoglobin level is low to be able to bind the oxygen, and could cause indirect effect for the pregnant women and the newborn including birth death, premature birth, and low-birth-weight. In Pakistan,

maternal anemia responsible for 13% of pregnant women death and 27% of post partum bleeding².

Based on research conducted by Saad (2008), revealed that iron intake twice a week effectively increase hemoglobin level on pregnant women by combining iron with other micronutrients (folic acid, vitamin A, vitamin C) compared to iron intake with only folic acid combination, nevertheless the average increase of hemoglobin level yet to show optimum result (0.59 gr/dl), thus it is necessary to create a more potent strategy by including nutrient education in that weekly supplementation of micronutrients³.

Low-birth-weight (LBW) recognized by the weight less than 2500 gram, and become one of the main risk of infant mortality. LBW also could cause interference in physical and mental development of the newborn. Some studies revealed that children that suffer from previous LBW having lower development pattern⁴.

Moringa Oleifera leaves have long been used to overcome the problem of malnutrition among children, pregnant women, and breastfeeding⁵. In addition, with micronutrients substances, *Moringa Oleifera* can be used an alternative supplement for pregnant women to prevent maternal anemia and LBW. Prevention of maternal anemia can decrease the incidence of pregnancy complication and low-birth-weight⁶. The purpose of this study was to assess the effect of *Moringa Oleifera* extracts to prevent maternal anemia and low-birth-weight.

II. MATERIAL AND METHOD

The study design was double blind, randomized, pretest-posttest controlled. The first trimester pregnant women that meet the inclusion and exclusion criteria were recruited consecutively. Sixty-four pregnant women enrolled, randomized to intervention and controlled group.

The intervention conducted for 90 days from 12-20 weeks of pregnancy age. The intervention group received one capsule of *Moringa Oleifera* extracts in the morning and one capsule iron and folic acid in the night. Subjects in the control group received placebo capsules in the morning as well as iron and folic acid capsule in the night. Body weight measure, mid-upper arm circumference, and food recall conducted in the end of the fourth, eighth, and twelfth week. Biochemical examination (posttest) conducted in the thirteenth week. The weight and the length of the newborn measure conducted within one hour after the birth.

To retrieve the extract, *Moringa* leaves was washed by dipping it into saline water for 3-5 minutes, *Moringa* leaves then air-dried in room temperature until the water content reach 10%. After the *Moringa* leaves dried, there are 90gr plus 10gr bitter maccerated dipped with ethanol for 24 hours, this treatment was repeated 3 times, then filtered to separate and extract the pulp. The extract were evaporated at a temperature of 30-40^o for 24 hours. The pulp was at a temperature 30-40^o for 48 hours. The result then inserted into an extract *Moringa* capsule.

The acquired data was analysed using statistical package for social science (SPSS) program v.20, which includes Nutrisurvey, Univariat analysis, and Bivariat Analysis.

III. RESULT AND DISCUSSION

Anemia status of pregnancy women in pre and post-intervention in both intervention and control group can be seen in the Table 1. Below.

Table 1. Anemia status of pregnancy women pre and post-intervention.

Variable	TO X SD	T3 X SD	Pair ed t- Test	Δ(T3- T0) X ± SD	Man n-U Whit ney
Hb					
Interven tion	11.19± 0.8	11.93± 0.9	0.00 3	0.73±1. 29	0.078
Control	11.5±0 .3	11.7±0 .3	0.26 8	0.21±1. 02	
Ferritin					
Interven tion	66.3±5 4.7	45.7±2 6.6	0.02 2	- 20.6±49	0.254
Control	65.4±8 1.2	26.9±1 9.0	0.00 7	.0 -	
				38.5±73 .4	
Erythrocyte					
Interven tion	3.8±0. 38	4.01±0 .28	0.69 1	0.28±0. 51	0.294
Control	3.9±0. 43	4.02±0 .34	0.11 5	0.15±0. 40	
Hematocrit					
Interven tion	33.9±2 .5	35.4±1 .58	0.81 9	1.95±3. 55	0.133
Control	34.2±2 .7	36.3±2 .65	0.28 2	0.74±2. 79	

Table 1. Above shows that haemoglobin level in the intervention group significantly increased (p<0.05), but the difference in haemoglobin level increase is not significant (p>0.05). Intervention group have 0.73 gr/dl haemoglobin level increase, while in control group the increase was only 0.21 gr/dl. Average decrease of ferritin in intervention group 20.6 µg/ml, while in control group 38.5 µg/ml. The decrease ferritin level in both groups was significant (p<0.05) but the decrease difference were not significant (p>0.05). Erythrocyte and hematocrit level

in both groups also increase although the difference was not significant.

Table 2. Distribution of birth-weight on both groups

Birth Weight	Intervention		Control		P Value
	N(%)	X+SD	N(%)	X+SD	
<2.5 kg	0 (0)	0	1(3.3)	0	n/a
2.5kg - 3 kg	19(52.8)	2.82±0.21	17(47.2)	2.75±0.18	0.307
3.1kg- 3.5 kg	10(52.6)	3.16±0.19	9(47.4)	3.31±0.15	0.824
3.51kg- 4 kg	4(50.0)	3.70±0.08	4(50.0)	3.75±0.13	0.537
Total	33(51.6)	3.07±0.37	31(48.4)	3.03±0.43	0.650

The above table shows that the highest birth-weight was on intervention group 33 (51.6%) with the average birth weight 3.07kg. The birth-weight difference on both groups were not significant (p=0.650). Low-birth-weight is not found on the pregnant women in intervention group, while there are 3.20% low-birth-weight in the pregnant women which intervention with iron and folic acid.

The assesment of maternal anemia in this study was conducted by examination of complete blood count, which are hemoglobin level, hematocrit, and erythrocyte examination continued by assessment of mean corpuscular values. Maternal anemia is a systemic psychological and physiological adaptation, particularly in cardiovascular system specifically in blood volume. The blood volume increase is a protective mechanism induced by (1) the hypertrophy vascular system because of uterus enlargement⁷. (2) hydration of foetus and mother tissue that had to be adequate when stand up straight or when lie down, and (3) the fluid reserve to replace missing blood in parturition and puerperium process⁸.

Normal birth weight has normal range for each gestational period in weekly count⁹. Foetus development in gestational period assessed to be normal whenever the weight is accordance to the gestational period. This study report the gestational period were in 37 to 41 weeks with birth weight 2.200-4.000 gr. Birth weight is defined by foetus nutritional status as well as genetic factors. Foetus nutritional status is defined by the pregnant women nutritional status when delivering newborn and this condition is effected by the nutritional status in pre-conception women¹⁰. The ninety days supplementation of *Moringa oleifera* leaf extracts did not bring significant effect to the birth weight. This condition probably happen due to the exact dose of *moringa* extract was not to be determined yet.

In conclusion, *Moringa oleifera* leaf extracts have significant effect to increase hemoglobin level in pregnant women, could prevent ferritin serum dismount to 50%. Low-birth-weight was not found on the pregnant women in intervention group, while there are 3.20% low-birth-weight in the pregnant women in control group. Further research is needed to confirm the exact dose of *Moringa oleifera* leaf extracts.

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