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Original Article

The Effect of Giving Iodized Salt and Multi Micro Nutrients to Pregnant Women on the Nutritional Status of Pregnant Women in Majene Regency

Darmin Dina[1,2]*, Nurhaedar Jafar[3], Veni Hadju[4], Hasnawati Amqam[5], Ridwan Amiruddin[6], Wahiduddin[7], Anwar Mallongi[8], Apik Indarty Moedjiono[9], Anang S. Otoluwa[10], Yulianah Sulaiman[11]

[1]*Hasanuddin University FKM Nutrition Science Study Program, INDONESIA.*

[2]*D III Midwifery Study STIKES Bina Bangsa Majene Program, INDONESIA.*

[3]*Hasanuddin University FKM Nutrition Science Study Program, INDONESIA.*

[4]*Hasanuddin University FKM Nutrition Science Study Program, INDONESIA.*

[5]*Hasanuddin University FKM Public Health Science Study Program, INDONESIA.*

[6]*Hasanuddin University FKM Epiodiomology Study Program, INDONESIA.*

[7]*Hasanuddin University FKM Epidiomology Study Program, INDONESIA.*

[8]*Hasanuddin University FKM Environmental Health Study Program, INDONESIA.*

[9]*Hasanuddin University FKM Bioastatistics Study Program, INDONESIA.*

[10]*UNTIKA Luwuk Faculty of Public Health, INDONESIA.*

[11]*D III Midwifery Study STIKES Bina Bangsa Majene Program, INDONESIA.*

Correspondence

Darmin Dina

Nutrition Science Study Program, Faculty of Public Health, Hasanuddin University Jl. Pioneers of Independence KM 10, Tamalanrea, Makassar City, South Sulawesi, INDONESIA.

E-mail: darmin_dina@yahoo.co.id

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ABSTRACT

Background: Maternal nutritional needs during pregnancy increase due to physiological, metabolic and anatomical changes. If the intake is insufficient, there will be deficiencies in both macro and micro nutrients. Multimicronutrient deficiency will affect the growth and anemia status of pregnant women. **Objective**: This study aims to determine the effect of giving iodized salt and Multi Micronutrient Supplements to pregnant women on hemoglobin levels, body weight, iodine levels in urine and pregnancy outcomes. **Method**: This research is an analytical research using an experimental design that controls several non-experimental variables and there is a control group as a comparison group to understand the effect of treatment. Determining the sample in this study used a random experimental method where 200 pregnant women were used as the research sample. The results showed that there was a significant change or increase in Hb levels (p=0.006; <0.000; <0.000), body weight (p=0.001; <0.000; <0.000), lila (<0.0015; <0.000; <0.000), Iodine levels (<0.000; <0.000; <0.000), between the group given iodized salt and MMS and the group given MMS. In this study, in the group of pregnant women who received iodized salt and MMS intervention, on average there was an increase or change in HB levels, iodine levels, mother's weight, baby's weight and abdominal length and circumference compared to those who received MMS. for pregnant women is to regularly maintain nutritional intake during pregnancy, especially consuming iodized salt and MMS which is beneficial for the health of pregnant women and the baby they are carrying.

Keywords: Pregnant women; Iodine Salt; Multi Micro Nutrient Supplement; Nutritional status.

INTRODUCTION

The high number of stunting incidents is a very worrying national problem. Stunting is a condition in children that can no longer be cured, but prevention is very important so that the number of stunting in an area does not increase[1]. Providing intervention to children who are already suffering from stunting will not have a significant impact on reducing stunting. So based on the considerations above, it is necessary to provide interventions to pregnant women in order to produce pregnancy outcomes whose nutritional status is guaranteed[2].

One of the factors causing stunting is normal baby weight which is the impact of nutritional deficiencies in pregnant women. Several studies were conducted in areas that had high cases of IDD and had very high stunting rates[3,4]. Especially in Majene Regency, according to previous research, from 500 salt samples that have been studied, the iodine content in household salt is 75% in household salt, 75% in the category is less than the standard of 30 ppm[1]. Research conducted in Enrekang Regency found that 44.8% of cases of STDs occurred and most of them came from endemic IDD areas[3].

Several studies conducted in Majene Regency, West Sulawesi Province and Enrekang Regency, South Sulawesi show that there is a correlation between areas that have high IDD status and the incidence of stunting[4]. Providing salt with iodine above 30 ppm can complete the iodine requirements in micronutrient supplements which is an intervention given to pregnant women in the Majene district area. Giving MMS to pregnant women reduces the risk of premature birth, Intrauterine Growth Restriction (IUGR), LBW, the risk of low gestational age [5,6,7], perinatal death and maternal death is also lower compared to giving TTD[8,9,10]. Research conducted in Purbalinggo, East Java, proves that multi-micronutrient supplementation 2-6 months before pregnancy has a better effect on the mother's immune response, as well as the production of the human placetal lactogen (hPL) hormone which ultimately increases placental weight and birth weight, as well as reducing the risk of abortion and prematurity[11,12]. Then research conducted in Banggae Regency, Central Sulawesi, proved that pregnant women who received MMS intervention had better pregnancy outcomes and the average body length of babies born to mothers in the MMS group was longer. Improving nutrition during pregnancy has a positive and long-term impact on the fetus, so intervention is needed during pregnancy in the form of micronutrient supplements [13,14].

The results of the examination showed that iodized salt with sufficient iodine content was consumed more in Enrekang than Majene (50% vs 4%)[4,15,16]. Apart from that, the amount of salt that does not contain iodine is higher in Majene based on the results of research conducted in two regencies, namely Enrekang Regency which represents the South Sulawesi provenance and Majene Regency which represents the West Sulawesi provenance. The median iodine level in urine was in the low

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category (<100 g/L), more commonly found in endemic areas than in non-endemic areas of Enrekang (24.8% vs 12.0%), and statistical tests showed significant values. Likewise, in Majene Regency, the median iodine level in the urine category was higher in endemic areas (22.4%) than in non-endemic areas (13.0%)[4,17]. Judging from their intelligence level, the majority of school-age children in endemic and non-endemic areas of Enrekang Regency are in the poor category, namely 99.2% and 92.3% respectively. Meanwhile in Majene Regency, all children in endemic areas are classified as low (100%), and only one child (0.4%) is in the average intelligence category in non-endemic areas[4,18]. Based on some of the literature above, researchers feel it is important to conduct research on the effects of giving iodized salt and MMS to pregnant women on the nutritional status of pregnancy outcomes in Majene Regency[4,19].

MATERIALS AND METHOD

This research is analytical research using an experimental design that controls several non-experimental variables and there is a control group as a comparison group to understand the effect of treatment[20,21,22]. This research design uses "Quasi Experimental". Quasi-experimental studies aim to evaluate an intervention and demonstrate a causal relationship between the intervention and the outcome. The research location was carried out in two sub-districts in Majene district. The time for conducting the research was from March to November 2023. The samples in this study were pregnant women in the first trimester and second trimester, which is the locus of the occurrence of stunting.

RESULTS

Based on table 1, maternal characteristics based on age, almost all were in reproductive age (20-35), both intervention (99.0%) and control (98%) and there was no difference in proportions between the two groups. In the maternal education group, generally elementary-middle school, intervention was 52.0% and control (49.0%). For employment characteristics, more mothers did not work in intervention (65.0%), control (70.0%). More fathers' occupations were fishermen in both intervention (45.0%) and control (40.0%). The characteristics of height are generally above 140 cm for both intervention (98.0%) and control (97.0%). The number of parities was greater than 2, namely the intervention group (66.0%) and control (64.0%). Meanwhile, according to pregnancy history, more people had never had an abortion, either intervention (97%) or control (93%) and there were no differences in characteristics between the intervention group and the control group.

Table 2 shows that the characteristics of the initial Hb examination results were that most mothers were anemic in both the intervention group (57.0%) and the control group (69.0%). UIE characteristics < 150µg/L in the intervention group (95.0%) in the control group (96.0%). Maternal characteristics regarding iodine knowledge in the intervention group more people did not know (63.0%) while in the control group (58.0%). And there was more knowledge about MMS in the intervention group (73.0%) and control (68.0%). And there were no differences in characteristics in the intervention group or control group.

The results of the analysis above show that there is a difference in the average initial HB (Hb1), HB Post 1 (Hb2) and HB Post 2 (Hb3) between the groups that received iodine salt and MMS compared to those who only received MMS with p-values respectfully. also 0.006 < 0.000 ; <0.000. With maternal weight, there is a difference in the average weight (BW) of early pregnant women, Post 1 BB and Post 2 BB between groups that received iodine salt and MMS compared to those who only received MMS with p-values respectively < 0.001; <0.000 ; <0.000. When measuring iodine levels in maternal urine, there were differences in iodine levels I, urine iodine levels 2 and iodine levels 3 between groups that received iodine salt and MMS compared to those who only received MMS with p-values respectively (0.000); (0.000).; (0.000).; In the lila examination, there were differences in the lila I, Lila II and Lila III examinations between the groups that received iodine salt and MMS compared to those who only received MMS with p-values respectively 0.015; 0,000; 0,000. which means there is a difference and from the mean difference it can be seen that the Hb level, body weight, urine iodine level and maternal lila at all times were higher in the iodized salt and MMS groups.

Table 1. Characteristics of mothers and families in the intervention and control groups.

Variables	Intervention (n=100)		Controls (n=100)		Total P Value (n=200)	
	n	%	n	%	n	%
Mother's Age						
<19 and >35	8	2.0	2	2.0	10	5.0 0.105
20-35 years	92	99.0	98	98.0	190	95.0
Mother's Education						
Elementary-middle school	52	52.0	49	49.0	101	50.5 0.213
SENIOR HIGH SCHOOL	40	40.0	35	35.0	75	37.5
D3-SI	8	8.0	16	16.0	24	12
Mother's Job						
Work	35	35.0	30	30.0	65	32.5 0.546
Not Working	65	65.0	70	70.0	135	67.5
Father's occupation						
Fisherman	45	45.0	40	40.0	85	42.5 0.567
Civil servant/honorary	28	28.0	27	27.0	55	27.5
Self-employed	27	27.0	33	33.0	60	30.0
Mother's height						
< 140 cm	2	2.0	3	3.0	5	2.5 1.00
≥ 140 cm	98	98.0	97	97.0	195	97.5
parity						
≤ 2	34	34.0	36	36.0	70	35.0 1.00
>2	66	66.0	64	64.0	130	97.5
History of pregnancy						
Had an abortion	3	3.0	7	7	10	5.0 0.33
Never had an abortion	97	97.0	93	93.0	190	95.0

Source: Primary Data 2023.

Table 2. Results of measuring Hb levels (g/dl), IUE (µg/L), and sample knowledge before intervention.

Variables	Intervention		Controls		Total P Value	
	n 100	%	n 100	%	n 200	%
Hb						
<11	57	57.0	69	69.0	126	63.0 0.1057
≥11	43	43.0	31	31.0	74	37.0
UIE						
<150	95	95.0	96	96.0	191	95.5 1.00
≥150	5	5.0	4	4.0	9	4.5
Iodine Knowledge						
Not enough	63	63.0	58	58.0	121	60.5 0.563
Good	37	37.0	42	42.0	79	39.5
MMS Knowledge						
Not enough	73	73.0	68	68.0	141	70.5 0.535
Good	27	27.0	32	32.0	59	29.5

Source: Primary Data 2023.

Table 3. Analysis of differences in Hb levels (g/dl) between groups of pregnant women received iodized salt and MMS than those who received MMS.

Variables	I	II	III	ΔI-II	ΔI-III	ΔI-III
	mean±SD	mean±SD	mean±SD	mean±SD	mean±SD	mean±SD
Hb						
Intervention	10.51±1.01	11.29±0.70	12.09±0.51	0.78±0.80	1.58±0.77	0.8±0.62
Controls	10.13±1.04	10.38±1.07	10.96±0.86	0.25±0.90	0.83±0.79	0.35±0.67
p-value	0.006	0,000	0,000	0,000	0,000	0.032*
BB Mom						
Intervention	55.47±4.12	58.47±4.03	62.24±3.94	3.00±0.83	6.77±1.42	3.77±1.20
Controls	52.66±5.30	55.1±5.16	57.54±5.19	2.44±0.54	4.88±0.82	2.44±0.56
p-value	0.001	0,000	0,000	0,000	0,000	0,000
Lila						
Intervention	26.58±1.18	27.48±1.83	28.35±1.74	0.88±1.22	1.77±0.98	0.89±1.07
Controls	25.97±1.66	26.31±1.51	26.77±1.37	0.35±0.68	0.80±0.95	0.46±0.77
p-value	0.015*	0,000*	0,000*	0,000*	0,000*	0,000*
UIE						
Intervention	110.01±22.61	208.62±51.69	263.77±57.55	98.60±57.85	153.75±64.06	55.15±67.57
Controls	119.11±15.71	152.24±33.38	167.54±38.65	33.12±31.17	48.43±37.90	15.30±26.30
p-value	0,000*	0,000*	0,000*	0,000*	0,000*	0,000*

DISCUSSION

1. Differences in administration of iodized salt and MMS regarding differences in levels HB mother.

This research shows that there are differences in initial HB (T0), HB Post 1 (TI) and HB Post 2 (TII) between the groups that received iodine salt and MMS compared to those who only received MMS with p-values respectively 0.006; <0.000 ; <0.000. This means there is a difference and from the median difference it can be seen that the change in HB at each time is higher in the iodized salt and MMS groups. This means that administering iodized salt at levels above 30 ppm greatly influences the increase in Hb levels in the blood[23,24]. Iodine plays a very important role in cell growth, including the growth of red blood cells, where if the growth of red blood cells is disturbed, a person will experience an Hb that is less than normal so they will experience anemia and especially pregnant women will have a detrimental effect on the growth of their fetus. Multimicronutrient supplements, which usually include a combination of essential vitamins and minerals, are sometimes recommended for pregnant women to address potential nutritional deficiencies. This supplement aims to support the health of the mother and developing fetus[25,26]. However, supplement administration will be more perfect if it is combined with the addition of iodine in salt that has been tested in the first laboratory[27,28,29]. Iodine also plays a very important role in the absorption of iron in the body, so it greatly influences the increase in Hb of pregnant women in the intervention group. The iodine level in salt was above 30 ppm, whereas in the control group the salt used varied[30,31,32]. This is in line with research by Brough L et al., 2010 showing that increasing consumption of micronutrients during pregnancy can improve the nutritional status of pregnant women where MMS contains iodine[33,34,35]. Giving MMS with added iodine salt shows the best results regarding the hemoglobin status of pregnant women. A study conducted in Ethiopia revealed that a diet rich in iron and giving supplements containing iron and iodine to pregnant women was significantly associated with increased hemoglobin levels, increased food intake in the intervention group compared to the control group[36,37,38] .

2. The effect of giving iodized salt and MMS on changes in maternal weight. mother's bat.

This research shows that there are differences in body weight (BW) of pregnant women at the beginning of T0, BW Post 1 (TI) and BW Post 2 (TII) between the groups that received iodine salt and MMS compared to those who only received MMS with p-values respectively also <0.001; <0.000; <0.000. This means there is a difference and from the median difference it can be seen that the difference in BW at each time is higher in the iodized salt and MMS groups. One of the functions of iodine is to speed up metabolic processes in the body,[39,40,41] so that if the iodine levels in a pregnant woman's body are met, the metabolic processes in her body will be good and will have an effect on the process of weight gain[42,43,44]. This is in line with the results of research conducted in

Boyolali showing that pregnant women in the Ampel II Community Health Center Work Area, Boyolali Regency, mostly had moderate iodine intake (50%), experienced weight gain (62.5%)[45,46,47].

3. The effect of giving iodized salt and MMS on changes in iodine levels in maternal urine.Research shows that there are differences in iodine levels in maternal urine, iodine levels I (T0), urine iodine levels 2 (TI) and iodine levels 3 (TII) between groups that received iodine salt and MMS compared to those who only received MMS with a p-value (0.000); (0.000).; (0.000).; The table above shows that there are differences and from the median differences it can be seen that the difference in maternal urine iodine levels at each time is higher in the iodized salt and MMS groups. Iodine is absorbed very quickly by the intestines and is used by the thyroid gland to produce thyroid hormones[48,49,50]. The main excretion channel for iodine is through the urinary tract and this method is the main indicator for measuring the amount of intake and iodine status[36,37]. The lowest excretion level (iodine status) (25-20 mg I/g creatine) indicates the risk of iodine deficiency, whereas lower levels indicate a more dangerous risk[51,52,53]. The status of iodine adequacy can be seen from the iodine content in the mother's urine, so that if the iodine level is 100 – 199 μg/L in adults and in pregnant women the iodine level within normal limits (150-249 μg/L)[54,55,56].

4. The effect of giving iodized salt and MMS on changes in maternal LIA.

This research shows that there are differences in the T0, TI, and T II pregnancy rates between the groups that received iodine salt and MMS compared to those who only received MMS with p-values respectively <0.015; 0,000; <0.000. which means there is a difference and from the median difference it can be seen that maternal urine iodine levels at all times were higher in the iodized salt and MMS groups. To fulfill the health of the mother and fetus, pregnant women need adequate nutrition to reduce potential nutritional problems.[57,58,59]. Therefore, implementing nutrition programs with special emphasis on nutritional attention in pregnancy during antenatal visits is considered important for rural women[60,61,62]. Providing micronutrient supplements supplemented with iodized salt affects body weight and also directly influences the increase in pregnancy in pregnant women[63,64,65]. Lila measurements are carried out to measure the nutritional status of pregnant women, whether they are in normal condition or KEK[66,67].

CONCLUSION

There are differences in hemoglobin levels in pregnant women who receive iodized salt and MMS compared to those who receive MMS alone. There is a difference in the weight of pregnant women who received iodized salt and MMS compared to those who received MMS alone. There are differences in iodine levels in the urine of pregnant women who receive iodized salt and MMS compared to those who receive MMS alone. There are differences in the flow of pregnant women who receive iodized salt and MMS compared to those who receive MMS alone.

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