The Effect of Eggs Consumption and Nutrition Counseling to the Increasing of Body Weight and Hemoglobin of Pregnant Women at Kassi-Kassi Health Center, Makassar City- Indonesia

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Abstract- This study aimed to assess the effect of eggs consumption and nutrition counseling to pregnant women to increased body weight and hemoglobin levels. A quasi-experiment with non-randomized pretest-posttest with control group design was applied within this study. The population is pregnant women who had antenatal care at health centers Kassi-Kassi. Samples were selected by purposive sampling, which are divided into treatment group who received nutritional counseling and eggs and a control group that did not get any treatment. The results of this study showed that weight gain at treatment group was significantly different with the control group. Hemoglobin levels of pregnant women in both groups before and after treatment were significantly decrease in which the control group decreased higher but not significantly different. Amount of energy and protein intake of pregnant women in the treatment group increased significantly while the control group of energy and protein intake does not significantly increase. It can be concluded that, eggs consumption and nutritional counseling affect an increase in energy and protein intake of pregnant women. Each health center suggested for implementing nutrition counseling for pregnant women who are chronic energy malnutrition (CEM) and from poor families can receive special attention so that the prevalence of maternal anemia could be reduced.

Index Terms- Nutrition counseling, hemoglobin levels, egg, pregnant women.

I. INTRODUCTION

Normal pregnancy is accompanied by anatomical and physiological changes that affect almost every organ system. Most of these changes can be seen in early pregnancy. Pregnant women, infants and toddlers are groups who are most vulnerable to malnutrition. Specifically pregnant women, the vulnerability seems that among 35% of women of childbearing age, which had protein energy malnutrition (PEM), 14% of those is pregnant women (Tambunan, 1996).

Nutritional problems of pregnant women have a broad impact, both to the mother and fetus, thus requiring special attention to it. The results showed a close correlation between anemia during pregnancy with fetal death, miscarriage, birth defects, low birth weight, reduced iron stores in children or children born in a state of nutritional anemia. This condition causes the perinatal mortality rate is still high, as well as maternal mortality and morbidity (Faruk, 2001). In addition, the impact on the mother is able to cause bleeding during delivery. Bleeding in childbirth is the leading cause (28%) of maternal deaths / maternity in Indonesia (MOH, 2001).

The prevalence of pregnant women with PEM increased during the economic crisis, reaching 24.9%. Despite the significant decline in the post-crisis economic recovery Indonesia, until now the prevalence of pregnant women is still high enough that PEM 16.7%. The high rates of malnutrition in pregnant women this has contributed to the high rate of low birth weight (LBW) in Indonesia is estimated at 350,000 babies each year (Depkes, 2003).

Based on a quick survey by the Health Department of South Sulawesi provincial office on 1998, which is conducted in three districts, found that pregnant women with PEM in the district of Takalar 32%, Pinrang 16.67%, and Bulukumba 17.70% (Bennu, 2002). Based on this study , the need efforts to improve the health and nutrition of pregnant women. One activity that can be done is by providing supplementary food namely eggs and nutrition counseling for malnutrition pregnant women. This also done in order to improve maternal nutritional status as well as to prevent the occurrence of low birth weight births.

II. MATERIAL AND METHODS

2.1 Study Area

This study was conducted in Health Center Kassi-Kassi Rappocini Makassar District. The population is pregnant women who suffer from PEM in the working area of the Health Centre and have geographic and social characteristics are relatively the same, with the inclusion criteria mother with age between 17-40 years old and have parity ≤ 4 child and maternal exclusion criteria pregnant with infectious diseases (pulmonary TB, malaria, intestinal worms) and noninfectious (diabetes, hypertension). The samples were divided into 2 groups: group 1 (treatment group) and group 2 (control group).

2.2 Sampling Design

This quasi-experiment research applied the non-randomized pretest-posttest with control group design. Initial measurements were taken before treatment (pretest) such as body weight,

hemoglobin concentration, nutrient intake and socio-economic status of the families. Treatment was conducted for 2 months (60 days), the day 61th was the final measurement (post-test) on body weight, hemoglobin level and nutrient intake. The treatment group was given 1 egg (60 g) for 60 days and nutritional counseling. Eggs are given each week and nutrition counseling given at the beginning of treatment and every pregnant women need information (if there is a pregnancy problem). As for the control group was not given anything, and due to ethical considerations at the end of the study pregnant women in the control group was given special milk for pregnant women.

Primary data were collected by interview using a questionnaire for socio-economic data and a 24-hour recall diet, anthropometric measures for nutritional status, and measurement of hemoglobin with cyanmethemoglobin method. As for the secondary data such as socio demographic conditions, geography, and other relevant data (state of health centers and facilities) were obtained from the health center.

2.3 Data Analyses

Data processing was performed using Food Processor (W-Food) and SPSS 16 for Windows. W-Food is used to process the data to obtain a recall nutrient intake results, are presented in the table with a scale interval (mean value) as well as data about Hb levels and body weight. Data on socio-economic characteristics of the subjects are presented in frequency distribution tables with ordinal scale, except for the age data , family size and length of education, with a scale interval (mean value). To determine the effect of egg and nutritional counseling, we use statistical analysis, univariate and bivariate analyzes.

2.4 Quality Control

Quality control was used to improve the internal validity of the study results, the entire research process from preparation, execution, until the stage of data processing. Standardization of quality control in the form of interviewer training, standardization of instruments, field supervision, treatment procedures, and the implementation phase.

2.5 Ethical Consideration

The pregnant women and or the guardians as well as the health staffs were requested as the respondent signed an informed consent letter prior to inclusion in the research. Confidentiality of initial information and freedom to withdraw from the study anytime was stipulated and without any force from the third parties. Those found to have health concerns will be provided with the appropriate management and informed secretly, as necessary.

III. RESULTS

3.1 Mothers Characteristics

Table 1 illustrates that the age of the treatment group and the control group is relatively homogeneous, the largest at the age of 21-30 years. The treatment and control groups are equal at the age of 21-30 years each for 18 people (60%). Aged 17-20 years were 9 people (30%) in the treatment group and 6 (20%). For gravidity, most respondents have one, namely 15 persons (50.0%) for the treatment group and 11 (36.7%) in the control group. Most of the respondents do not have children yet, either in the control group or in the treatment groups, that are 15 (50.0%) and 11 (36.7%), so mostly this is the first pregnancy, in the treatment group = 15 (50.0%) and 11 (36.7%) in the control group. The fourth pregnancy was the smallest either the treatment group or the control group 1 (3.3%) and 3 (10.0%). Pregnant women who have never given birth have the most percentage in both groups: 15 (50.0%) and 11 (36.7%).

At the pre test, the mean body weight and height of pregnant women respectively 45.83 ± 4.92 kg and 151 897 ± 4.6095 cm in the treatment group, whereas in the control group were 47.95 ± 4.95 kg and 152 933 ± 5.3875 cm. The average of Upper arm circumference measurement were 22.0330 ± 1.1435 cm in the treatment group and 22 543 ± 1.0398 in the control group. Statistical analysis using Independent t-test, showed that height, weight, upper arm circumstance of pregnant women between treatment and control groups were not significantly different ($p > 0.05$).

Table 1. Distribution of respondents by age, gravid and parity

Characteristics of Respondents	Groups		Total
	Intervention (n=30)	Control (n=30)	
Age groups (year)	9 (30.0%)	6 (20.0%)	15 (25%)
17 - 20	18 (60.0%)	18 (60.0%)	36 (60%)
21 – 30	3 (10.0%)	6 (20.0%)	9 (15%)
≥31			
Gravid			
1	15 (50.0%)	11 (36.7%)	26(43.3%)
2	10(33.3%)	9 (30.0%)	19(31.7%)
3	4 (13.4%)	7 (23.3%)	11(18.3%)
4	1 (3.3%)	3 (10.0%)	4(6.7%)
Parity			
0	15 (50.0%)	11 (36.7%)	26(43.3%)
1	10 (33.3%)	9 (30.0%)	19(31.7%)
2	4 (13.4%)	7 (23.3%)	11(18.3%)
3	1 (3.3%)	3 (10.0%)	4(6.7%)
Nutritional Status	151.897±4.6095	152.933±5.3875	0.427
Mean of height (cm)	45.83±4.92	47.95±4.95	0.566
Mean of weight (Kg)	22.0330±1.1435	22.543±1.0398	0.74
Mean of upper arm circumstance			

2. Weight between groups before and after giving eggs and nutritional counseling

After two months of treatment the results showed that, there are significant differences in both groups. In the pretest, the average body weight of the treatment group was 45.83 ± 4.92 kg changed to 48.84±5.55 kg. Statistical analysis using paired t-test results showed that there were no significant differences between before and after treatment ($p = 0.000 < 0.005$). Similar results

were also found in the control group, where in the pre- test the average body weight were 47.95 ± 4.95 kg changed to 49.74±5.38 kg, the results of paired t test showed that there is a significant differences between before and after two month treatments (p = 0.000 < 0005).

If we compared between the treatment and control groups, the results showed that, there were an increase of average body weight. The average increase of body weight in the treatment group was higher (3.0167 ± 1.87839 kg) compared with the control group (1.8000 ± 1.66412 kg). Statistical analysis results using an independent sample t- test, showed that there is a significant difference between the average body weight in the treatment group and the control group (p= 0.020 <0.05). Table 6 shows the rate of increase (velocity) in the treatment group was 6.5%, whereas in the control group was 3.7%. Thus the rate of weight gain based on a percentage of the treatment group two times greater than the control group.

Weight gain with sufficient status increased in the treatment group from 14 people (46.7%) to 22 people (73.3%). In contrast to the control group, number of mother who have sufficient weight decreased from 11 respondents (36.7%) to 10 (33.3%) and the number of respondents who had less weight only increase from 19 people (63.3%) to 20 people (66.7%).

Table 2. Weight Gain in trimester II and III between groups

Gain Weight (GW)	Groups	
	Intervention	Control
Trimester II Enough Less	(n=11) 8 (72.7%) 3(27.3%)	(n=11) 5(45.55%) 6(54.5%)
Trimester III Enough Less	(n=19) 14 (73.7%) 5(26.3%)	(n=18 5(27.8%) 13(72.2%)
Mean of WG on 2nd Trimester	2.6273±2.17720	1.8545±2.32953
Mean of WG on 3rd Trimester	3.2422±1.70435	1.9000±1.91004

Table 2 showed that, gain enough weight in the second trimester was higher in the treatment group 72.7% compared to the control group 45.55%. In the third trimester sufficient gain weight status was also higher in the treatment group 73.7%, while in the control group = 72.7%. The average weight gain trimester 2 and 3 were higher in the treatment group, respectively 2.6273 ± 2.17720 and 3.24221 ± 1.70435 kg compared to the control group 1.8545 ± 2.32953 and 1.9000 ± 1.91004 kg.

3. Differences in hemoglobin levels between groups before and after giving eggs and nutritional counseling

Table 3 shows that there were no treatment effect on maternal hemoglobin levels, even decreasing hemoglobin significantly in both groups. In the treatment group the average Hb levels at pre-test were 10,87 ± 1,27 g/dl decreased to 10,13 ± 1,24 after treatment, paired t-test results showed that, there were a significance differences in Hb levels between before and after treatments (p = 0.008 < 0.05). Similar results were also found in the control group, Hb at pre-test were 11, 04 ± 1, 03 g/dl decreased to 10,:11 ± 1,09 g / dl, the results of paired t test showed that there were a significant change (p = 0.000 <0,05).

Comparing between the treatment and control groups, the results of the study showed that, the average decrease in HB levels higher in the control group (-0.9367 ± 1.19409 g / dl) than in the treatment group (-0.7433 ± 1.42095). Statistical analysis results with an independent sample t- test showed that, there is no difference between the mean decrease in hemoglobin level between before and after treatment (p-value= 0,571 > 0.05). Table 6 shows the rate of increase (velocity) in the treatment group was -6.8% of initial Hb. Whereas in the control group -8.4% of initial Hb. Thus the percentage rate of Hb decline were greater in the control group than the treatment group.

Table 3. Differences in hemoglobin levels in the beginning and end of the study between groups

Groups	Hb (begining)	Hb (End)	*P Value*	The mean decrease
Intervention	(n=30) 10.87±1.27	(30) 10.13±1.24	0.008[a]	(n=30) - 0.7433±1.42095
Control	(30) 11.04±1.03	(30) 10.11±1.09	0.000[a]	(n=30) - 0.9367±1.19409
P Value	0.566[b]	0.948[b]		0.571[b]

4. Nutrient intake between groups

Description of nutrient intake of pregnant women showed in Table 4, at pre-test the average energy consume were below from the recommended average nutritional adequacy rate. Although not suitable with the recommended average nutritional adequacy rate, energy consumption before and after treatment in the treatment group were significant. The average energy consumption at pre-test were 882.33±273.455 kcal changed to 1817.4±762.616 kcal.

Table 4. Energy intake before and after Intervention in both groups

Groups	Energy Before	Energi After	*p*-Value	Mean Increase
Intervention	(n=30) 882.33±273.455	(30) 1817.4±762.616	0.000[a]	(n=30) 900.35±705.025
Control	(30) 1137.43±628.334	(30) 1195.9±432.850	0.466[a]	(n=30) 58.4667±433.22
p-Value	0.046[b]	0.000[b]		0.000[b]

The results of paired t- showed that there is a significant differences between before and after in the treatment group (p = 0.000), while In the control group there was no significant differences in energy consumption before and after treatment (p = 0466). The average increase in energy intake was higher in the treatment group (900.35 ± 705 025 kcal) compared to the control group (58.4667 ± 433.22 kcal). The mean increase in energy intake was significantly different (p = 0.000). Table 6 shows the rate of increase (velocity) in the treatment group was 105.9% of the initial energy. Whereas in the control group 5.1% of the initial energy.

Table 5 illustrates the protein intake in the intervention group increased from 16 616 to 31 543 gr. The average Increased of protein intake in the treatment group before and after treatments was significantly difference (p = 0.000), unlike in the control group, protein intake were decrease from 23 116 g to 20.7567 grams, but there was no significant difference (p = 0.563) of protein intake in the control group before and after treatments.

Table 5. Protein intake before and after treatment Intervention in both groups

Groups	Protein Before	Protein After	*p*-Value	Mean Increase
Intervention	(n=30) 16.616±11.617	(30) 31.543±16.962	0.000[a]	(n=30) 14.9267±18.27
Control	(30) 23.116±19.686	(30) 20.7567±11.77	0.563[a]	(n=30) -2.3600±22.1144
p-Value	0.125[b]	0.006[b]		0.002[2]

a= paired t test *b= independent t test*

Table 6 shows the rate increase (velocity) of protein intake in the treatment group was 89.8% of the initial protein. Whereas in the control group -10.2%. Thus the percentage rates of increase of protein intake in the treatment group were 91 times greater than the control group.

Table 6. Weight Velocity, hemoblobin, energy, and protein intake before and after treatment in both groups

	Intervention	Control
Body Weight		
Mean before (Kg)	45.83	47.95
Mean After (Kg)	48.84	49.74
Velocity (%)	6.5	3.7
Hemoglobin		
Mean before (mg%)	10.87	11.04
Mean After (mg%)	10.13	10.11
Velocity (%)	-6.8	-8.4%
Energy		
Mean before (kcal)	882.33	1137.43
Mean After (kcal)	1817.4	1195.9
Velocity (%)	105.9	5.1
Protein		
Mean before (g)	16.616	23.116
Mean After (g)	31.543	20.7567

Velocity (%)	89.9	-10.2

Velocity = (X after – X before) /X before x 100%

IV. DISCUSSIONS

The effect of egg consumption and nutrition counseling to the weight gain of pregnant women

Weight gain during pregnancy is natural and is essentially in accordance with the development of the fetus in the womb. Pregnant women will naturally increase the size of the meal according to the needs of the increasing nutritional intake. The increase in maternal weight gain during pregnancy is influenced by various factors, the most important state of nutrition of pregnant women and mother's diet during pregnancy takes place. Weight changes before pregnancy and during pregnancy is an important clinical parameter to predict birth weight infants. Women with low body weight before pregnancy, or low weight gain before pregnancy, or weight gain is not enough during pregnancy tend to give birth with low birth weight.

In this research, weight of pregnant women have done three times, namely before treatment (on May), one month of treatment (in June) and two months of treatment (in July). The results showed that, after one month of treatment, there were a significance differences in both groups. Giving eggs and counseling in this study did not significantly influence the weight gain in pregnant women. This is evidenced by the results of statistical tests on the paired t-test in both groups, where there is an increase in the treatment group significantly more weight but the same thing also occurred in the control group. Meaning is not clear noticeable difference in weight gain of pregnant women who receive eggs and counseling with pregnant women who did not receive eggs and counseling.

On this phenomenon paired t-test results will provide real results will differ but for the efficacy of the treatment of weight gain should justify with the results of independent t-tests which showed no difference in weight gain between the two groups, However, when comparing the difference in maternal weight gain before and after treatment, between treatment with the control groups, its showed the difference. Maternal weight gain in the treatment group (3.0167 ± 1.87839 kg) higher than the control group (1.8000 ± 1.66412 kg) and statistically different ($p = 0.020$).

Increase in average of maternal body weight for 8 weeks in the treatment group was 3,01 kg. Thus each week maternal weight gain on the average 0,37 kg. In the second trimester the average maternal weight gain of 2.6 kg in the treatment group mean body weight per week on average trimester 2 is 0,32 kg. In the third Trimester, mean 3,24 kg weight gain per week means the average maternal weight gain 0.4 kg. According to the Brown (2005), normal weight gain around 0,35 to 0,40 kg per week during the second and third trimester of pregnancy. Overall weight gain per week including 0:37 normal criteria, while for the second trimester maternal weight gain below the normal criteria. In the third trimester of pregnancy weight gain pregnant women including normal criteria. This results is in accordance with the Arisman (2004) , that weight gain on second and third trimester around 0,34 to 0,50 kg per week is still within normal limits.

In the control group the average weight gain of pregnant women as a whole is 1.8 kg for 8 weeks. Thus the weight of an average of 0.2 kg per week. For the 2nd trimester the average of maternal weight gain 1.85 kg mean weight average of 0,23 kg per week. For the third trimester the average weight gain of 1.9 kg, mean weight average of 0:24 kg per week. Thus maternal weight gain in the control group both overall, Gain weight increase in trimesters 2 and 3 are less or below the Indonesian Health Department criteria that range 0,35 to 0,40 kg per week. Weight gain is also incompatible with Arisman (2004) is 0,34 to 0,50 kg per week.

Maternal weight gain in the treatment group as a whole was higher than the control group. Gain weight increase in the control group as a whole is in compliance with the criteria and is expected to reduce the risk of low birth weight, quitting growth in uterus and perinatal death. Pregnant women in the control group at risk of having a baby with low birth weight (LBW) due to low birth pregnant women suffering from malnutrition during the last week of LBW infants at risk of giving birth this caused a lot of fatty tissue deposited during the third trimester.

According to Harisawaty Research (2008), nutritional counseling given to pregnant women during two months will give an effect to maternal weight gain in pregnant women, the average increase was higher in the treated group than the control group despite of these increase did not differ significantly. This is consistent with the results of the Kafatos et al study (1989), which states that nutritional counseling during pregnancy can increase the nutrient intake and weight gain of pregnant women. Similarly, research results of Taddaga (2006) that, giving local MP-ASI (yolk) effect on weight gain and nutritional status of infants aged 6-11 months. Weight gain in pregnancy is caused by the products of conception such as the placenta, fetus, and the amniotic liquor of his own mother the uterus and mammary enlarged, increased blood volume, increased protein and fat, as well as the retention of blood. Weight gain during pregnancy influence fetal growth in the womb mass.

During the first trimester, the range should be 1-2 kg weight gain and for the second and third trimester of approximately 0.34 to 0.5 kg per week. Weight gain <0.5 kg during the second trimester third trimester moreover, is clearly not enough and can increase the risk of low birth weight, quitting the growth in the womb, and perinatal death. Although the rate of maternal weight gain in the second and third trimester is basically the same, and the accumulation of capital portion of fetal tissue accretion does not take place simultaneously. Component accretion occurs in the mother's body during second trimester. While the fetus and placenta as well as the addition of amniotic fluid takes place very rapidly during the third trimester.

At the end of the study, the difference in weight gain between the treatment and control groups was not significant by unpaired t test. However, if viewed from the weight of each week there is a marked difference between the treatment groups with the control group, in which the weight gain in the treatment group including normal criteria in accordance with the criteria set by the Ministry of Health. whereas in the control group or the less weight gain than under normal criteria. So there is a significant difference in weight gain in the group gets the eggs

and nutrition counseling over the control group. The proportion of pregnant women of less weight gain be sufficient in this study are more common in the treatment group compared to the control group 62.5% 31.5%. It is proved that a real improvement in the status of less weight gain, very good on pregnant women are given eggs and nutritional counseling than women who did not receive eggs and nutritional counseling. Even in this research note that the proportion of women who initially gain enough weight and become less high in the control group 63.6% compared to 14.2% treatment group.

Velocity is a parameter to assess the rate of increase in a variable than initial conditions. Velocity in the treatment group significantly better than the control group, so it can be proven that the trend towards an increase in body weight change better if the expectant mother is given an egg and nutritional counseling. This is consistent with the expectation that if the egg and nutrition counseling given to pregnant women malnutrition will cause pregnant women are able to increase their weight in accordance with the criteria of maternal weight gain and ultimately not expected that children who are born LBW.

The effect of egg consumption and nutrition counseling to pregnant women for elevated levels of hemoglobin

After giving the eggs for 60 days and counseling in the treatment group and the control group did not receive anything, it is showed a significant decrease in hemoglobin levels in both groups. Decrease in hemoglobin levels in the control group was higher than the treatment group. Decrease in hemoglobin levels in the treatment group was -0.7433 ± 1.42095 g/dl, while in the control group -0.9367 ± 1.19409 g/dl. Pregnant women who suffer from anemia also increased at the end of the study in both groups, 46.7% to 73.3% in the treatment group and 33.3% to 63.3%in the control group, respectively.

The statistical analysis results showed that, the provision of eggs and nutritional counseling could not increase hemoglobin levels in pregnant women. Maternal hemoglobin levels decreased even better in the treatment group and the control group, so that the number of pregnant women suffering from anemia has increased after the intervention. This is caused by several factors, including increased iron requirement in pregnancy and the lack of good iron intake from foods and iron supplements. The rate of decline in hemoglobin levels in the control group is -8.4% higher than the treatment group compared to the initial Hb is -6.8%. This means that with the intervention of the eggs and nutritional counseling cannot suppress an increase in cases of anemia. Decrease in Hb levels of pregnant women caused due to blood volume during pregnancy nearly full-term, the blood volume will increase by 45% above the non-pregnant woman. This increase occurs because the enlarged of uterus which is needed for fetus, placenta and blood svolume expansion.

Iron is needed by pregnancy woman much more than non pregnant woman. Iron in pregnant women is needed in addition to losing basal meet, also for the formation of red blood cells as well as the growing fetus and placenta. Iron needs at each trimester of pregnancy vary. In the first trimester, iron requirement is lower than the period before pregnancy; the pregnant woman is not menstruating due to the fetus and not need a lot of iron. Ahead of the second trimester iron needs began to increase. At this time occurred in the number of red blood cells, which will continue until the third trimester. Hemoglobin concentration decreased during the second trimester to reach an average of 1 g/dl. Anemia is cause by physiological plasma volume increases far above the increase in the number of red blood cells. In the second and third trimester pregnant women need iron in significant amounts, which cannot be obtained only from food alone. Therefore, in the second and third trimester, pregnant women should get an extra iron in the form of iron supplementation.

Decrease in hemoglobin levels in pregnant women due to a lack of iron intake from both food and supplements. Pregnant women who received iron tablets only 16 person (53.3%) in the treatment group and in the control group was 19 (63.3%). Pregnant women who received iron tablets in the treatment group (7.87 ± 10,194) and the average taken iron tablets (5.8333 ± 8.86327), while the control group mean given iron tablets (6:21 ± 7,729) and iron tablets consumed (4.8333 ± 6.16488) for intervention. Consumption of iron tablets to pregnant women should be 90 tablets recommended during the pregnancy. So, every day for three month pregnant women are required to take one iron tablet. Low consumption of iron tablet will cause high risk of suffering from anemia, iron is necessary for the formation of hemoglobin in the spleen. Deposits of iron in the spleen and muscle were mobilized for the purposes of the body such as the formation of hemoglobin. So the lower the consumption of iron tablets followed by low levels of hemoglobin, and vice versa higher consumption of iron tablets followed by increased levels of Hb. These results are also consistent with studies of Daud (2004) in Takalar where the prevalence of anemia decreases from 80% to 20% after administration of iron and zinc tablets.

Next, Aashima (2006) in her study revealed that, counseling, motivation and periodic reinforcements to take the iron supplements daily and regularly resulting in improved compliance to iron supplements, combined with the improvements in the dietary intake especially the GLVs consumption, resulted in improved mean hemoglobin levels of the subjects in the intervention group as compared to control group. Some other studies have also shown that regular daily supplementation of iron and folate to pregnant women can significantly contribute to reduction in anemia prevalence (Gopalan, 2003). Counseling micronutrient and supplementation may improve hemoglobin and dietary intake of pregnant woman (Hapzah, 2013). In addition to a lack of iron tablet consumption, mean intake of iron from food is also less i.e. (5.9057 ± 6.0096 mg) or 15.1% of the RDA in the treatment group and (3.0807 ± 1.2681mg) or 7.8% of the RDA in the control group. Iron consumption figures according to the recommended dietary allowance is 39 mg. Food supplement is given to pregnant women that the iron content of eggs is only 0.66 mg (1.8% of the RDA), so it cannot meet the daily iron needs. Daily dietary intake of iron is less supported by low socioeconomic so that access to food, especially protein and fruits are very less. The results of this study found that, the average iron consumption is still far below the normal value (<50% RDA), this suggests that the consumption of foods that contain less iron continuously can cause anemia in pregnant women because of increased demand. The Increasing of gestational age the amount of iron needed is also higher in the first trimester (26 mg), second trimester (35

mg), and in the third trimester (39 mg). Increased iron requirement in pregnancy and iron intake resulted in less number of anemia in pregnant women is increasing at the end of the study, from 46.7% increased to 73.7% in the treatment group and increased from 33.3% to 63.3% with anemia in the control group. Pregnant women with less chronic energy is a risk factor for anemia . Respondents in this study were pregnant women who suffer from PEM have the opportunity to develop anemia. This is consistent with research results of Darlina et al (2003) in Bogor, pregnant women with PEM likely to suffer from anemia, 2.76 times greater than that no PEM. A high percentage of women at 20 to 26 weeks of pregnancy had mild to moderate anemia. Pica, tea consumption, and low intake of eggs and red meat were associated with anemia. Women of childbearing age should be provided nutritional education regarding food sources of iron, especially prior to becoming pregnant, and taught how food choices can either enhance or interfere with iron absorption (Naila Baig-Ansari, 2008)

The effect of egg and nutrition counseling to pregnant women to increase energy and protein intake

One egg containing energy ± 85 kcal, protein 6.9 g, calcium 28, magnesium 6, Fe 0.66, phosphorus 95, 24, and folic acid Vitamin A 105. Eggs are given for 60 consecutive days. In addition to egg, treatment groups were also given counseling. Whereas the control group did not receive anything.

Nutrient intake is one of the direct causes that affect the nutritional status of pregnant women. Intake of these nutrients depends on the availability of food in the household and feeding behavior of pregnant women. In the treatment group, there was a significant difference of energy and protein intake before and after treatment (p = 0.000). Whereas in the control group, energy and protein intake before and after treatment was no significantly difference (p = 0466) and energy intake (p = 0.563) protein intake. Even decreased protein intake in the control group at the end of the study. The increase rate of energy intake is 105.9% and 89.8% of protein intake in the intervention group while the control group 5.1% -10.2 energy intake and protein intake. of these results look very much difference in energy and protein intake between the treatment and control groups. The rate of increase in energy intake in the intervention group was 21 times greater than the control group. Eggs and nutritional counseling provision affects the increase rate of energy and protein intake of pregnant women.

Giving eggs and nutrition counseling to pregnant women affects the increase in energy and protein intake. This is consistent with studies of kafatos et al. (1980), which is states that nutritional counseling during pregnancy can increase the nutrient intake of pregnant women. The results showed that nutritional counseling and provision of eggs may increase nutrient intake of pregnant women. Harisawaty Research (2008) in RSB Pertiwi found that, nutrition counseling in pregnant women increases the amount of energy and protein intake significantly.

Energy intake of pregnant women is closely related to the growth of the fetus, it is recommended that pregnant women can increase the number of calories by 300 kcal in the second and third trimesters to determine the adequacy of the amount of energy consumed by pregnant women can be done with a 24-hour food recall and monitoring maternal weight gain (Hadju et al, 2002). Then, Lagiou (2004) study implied that there is a relationship between the regulation of energy intake with maternal weight gain at the end of the second trimester (p =0.006). Results of other studies suggest that there is a relationship between the intake of nutrition counseling for pregnant women ($p< 0.05$) (Sacco, 2003). Bermúdez-Millán et al.(2009) showed that eggs and egg-containing traditional dishes are consumed by Latinas before and during pregnancy. Egg consumers had higher intakes of protein, fat, vitamin K, vitamin E, selenium, beta carotene, lutein and zeaxanthin, cholesterol, total polyunsaturated fatty acids, and docosahexaenoic acid. Eggs contribute significantly to the diet of pregnant Latinas. For example, research continues to support a role for omega-3fatty acids in the proper neurological development of the fetus and child (Makrides 2008). These findings are fully consistent with the fact that eggs are a good source of at least 11essential nutrients (Hasler 2000). Similar to our study, Song and Kerver (2000) found that eggs were an important contributor to nutrients in the diets of Americans. Eggs contributed significantly to the intake of several essential nutrients, even after adjusting for energy intake. Pregnancy causes increased energy metabolism, because it needs energy and other nutrients increases during pregnancy. Increased energy and the nutrients required for the growth and development of the fetus, increasing the magnitude of organ content, composition and metabolic changes in the mother's body. So the lack of certain nutrients needed during pregnancy can lead to fetal growth is not perfect. For pregnant women, basically all require additional nutrients, but is often a lack of energy, protein and some minerals like Iron and Calcium (Lubis, 2003).

As with energy, protein needs of pregnant women will also increase, even reach 68% of pre-pregnancy. The amount of protein that should be available until the end of pregnancy is estimated as many as 925 g stays in the mother, placenta, and fetus (Lubis, 2003). Calorie intake required for adult pregnant women about 2200 kcal and 67 g protein. Energy intake in the treatment group and 80% protein 60% of the RDA while a control group of energy and protein intake respectively 54.31% and 30.8% of the RDA. Energy intake in the treatment group with sufficient status increased in the treatment group while the control group no change before and after treatment. On protein intake with sufficient status increased from 0% to 10% while in the control group with a status sufficient protein intake decreased from 10% down to 0%. Energy and protein intake below the RDA are caused by the economic status of respondents either in the treatment group or control group including less. Although the energy and protein intake are still below the RDA, but in the treatment group there was a significant improvement. Giving eggs and nutritional counseling could affect the protein and energy intake of pregnant women.

Pregnant and lactating women require additional dietary protein to support the growth and development of the infant. Recommendations for protein are increased by 14 grams a day during pregnancy, and an extra 21 grams a day is recommended during lactation (National Health and Medical Research Council, 2006). A serve of eggs (One serve = 2x60g eggs (104g edible portion) provides 12.7 grams of protein, accounting for almost

100% of the additional protein requirements during the 2nd and 3rd trimesters of pregnancy. The protein in eggs provides all the essential amino acids and is of a high bioavailability, which makes them a particularly useful source of protein during pregnancy and lactation (FAO/WHO, 1991)

V. Conclusion

Maternal weight gain in the treatment group and the control group, before and after treatment increased significantly. Weight gain greater in the treatment group over the control group, the magnitude of weight gain different significantly. Blood hemoglobin levels of pregnant women treated group and the control group, before and after treatment decreased significantly. The control group experienced a decrease higher than the treatment group, but not significantly different. Amount of energy and protein intake of pregnant women in the treatment group increased significantly while in the control group, the energy and protein intake does not increase significantly, decreased protein intake even at the end of the study. Thereby giving the eggs and nutritional counseling affect an increase in energy and protein intake of pregnant women.

Suggestion

Each health center suggested to implementing nutrition counseling for pregnant women who has protein energy malnutrition (PEM) and from poor families can receive special attention so that the prevalence of maternal anemia and could be reduced. This research is still necessary to continue to monitor pregnant women until give birth to determine the outcome of pregnancy as a result of eggs consumption and nutritional counseling.

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Conflict of Interest

The authors declare no conflict of interest.

References

[1] Arisman, 2004. Nutrition in the Life Cycle: Iron Deficiency Anemia. Book Medical Publishers EGC, Jakarta.

[2] Bermúdez-Millán et al.2009. *Egg Contribution Towards the Diet of Pregnant Latinas*. Ecol Food Nutr. 2009 ; 48(5): 383–403

[3] Brown. Judith E. 2005. Nutrition through the life cycle. Second edition. International Thomson company: wadswort.

[4] Darlina and Hardisnyah, 2003. Risk Factors for Anemia in pregnant women in the city of Bogor. Media and the Family Nutrition, Vol.27 No. 2. Department of Community Nutrition and Family Resources Faculty of Agriculture, IPB Bogor

[5] Daud N A, 2004. Effect of Zinc and Food Supplement In Less Energy Against Pregnant Women and Birth Weight Infant Nutritional Status. Dissertation, Makassar. graduate Unhas

[6] Depkes R.I. dan WHO, 2003. Indonesia Reproductive Health Profile 2003. Jakarta

[7] FAO/WHO, 1991, Protein quality evaluation, in Report of the Joint FAO/WHO Expert Consultation. FAO/WHO: Bethesda, USA

[8] GargAashima, SushmaKashyap. 2006. *Effect of Counseling on Nutritional Status During Pregnancy*. Indian Journal of Pediatrics, Volume 73—August, 2006

[9] Gopalan C. 2003. Changing nutrition scene in South Asia. NFI Bulletin 2003; 24 (2): 1-8

[10] Gopalan C. 2003. Changing nutrition scene in South Asia. NFI Bulletin 2003; 24 (2): 1-8.

[11] Hadju, V and Thaha, 2002. Nutrition For Pregnant Women, Foundation Publishers Indonesian Doctors Association, Makassar.

[12] Hapzah, Hadju, V., Sirajuddin,S. 2013. The Effect Of Nutrition Counseling And Twice A Week micronutrient Supplementation Toward The Increase Of Hemoglobin Levels And Maternal Food Intake. Media Gizi Masyarakat Indonesia, Vol.2,No.2,Februari 2013 :64-70

[13] Harisawati H. , 2008. Nutrition Counseling For Change In Pregnancy Eating Behavior And Nutritional Status During Pregnancy. Hasanuddin University Graduate Program. Makassar.

[14] Harisawati H. 2008. Konseling Gizi Pada Ibu Hamil Untuk Perubahan Perilaku Makan Dan Status Gizi Selama Kehamilan. Program Pascasarjana Unhas. Makassar

[15] Hasler CM. 2000. The changing face of functional foods. Journal of the American College of Nutrition.2000; 19(5):499S–506S

[16] Kafatos, A. G., Vlachonikolis, I. G. & Codrington, C. A. 1989. Nutrition during pregnancy: the effects of an educational intervention program in Greece. Am. J. Clin. Nutr. 50: 970–979

[17] LM Sacco, LE Caulfield, N Zavaleta, and LRetamozo. 2003. *Dietary Pattern and Usual NutrientIntakes of Peruvian Women during Pregnancy*.European Journal of Clinical Nutrition 2003:57; 1492–97

[18] Lubis, Z. , 2003. Maternal Nutritional Status and Its Effect on Infants are born. Postgraduate Institute of Agriculture Bogor.

[19] Makrides M. 2008. Outcomes for mothers and their babies: Do n-3 long-chain polyunsaturated fatty acidsand seafoods make a difference? Journal of the American Dietetic Association. 2008; 108(10):1622–1626

[20] Martini Bennu. 2002. Pengaruh Pemberian Makanan Tambahan (PMT) Pada Ibu Hamil Kurang Gizi Terhadap Berat Lahir Anak di Kabupaten Takalar Tahun 2002. Pasca Sarjana Universitas Hasanuddin, Makassar.

[21] NailaBaig-Ansari, et al. 2008. *Anemia prevalence and risk factors in pregnant women in an urban area of Pakistan*. Food Nutr Bull. 2008 Jun;29(2):132-9

[22] National Health and Medical Research Council, 2006.Nutrient Reference Values for Australia and New Zealand including Recommended Dietary Intakes.Canberra: NHRMC

[23] P Lagiou et al. 2004. *Diet during Pregnancy in Relationto Maternal Weight Gain and BirthSize*.European Journal of Clinical Nutrition2004: volume 58

[24] Song WO, Kerver JM. 2000. *Nutritional contribution of eggs to American diets*. Journal of the American College of Nutrition. 2000; 19(5):556S–562S

[25] Suyogo, 1997. Nutrition In Pregnancy., Health Magazine, Vol.47.

[26] Taddaga K. 2006. Impact Giving Local MP-Asi (Yellow Egg) and Mentoring Against Nutritional Status of Infants Age 6-11 Months in the Village Kaluku Bodoa Tallo district of Makassar. Hasanuddin University Graduate Program. Makassar.

[27] Tambunan, V. 1996. Gizi Optimal Pada Kehamilan. *Majalah Kesehatan Masyarakat Indonesia*. Tahun XXIV, nomor 8

[28] Yuniarti, Hana, Drajat Boediman, and Toto Sudargo. , 2005. Nutrition Counseling influence the nutritional status of pregnant women against SEZs in JPS-BK program in the city of Palembang. IJCN Vol 1 No.. 3.

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