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NUTRITIONAL CONSULTATION ON PREGNANT WOMEN: EFFECT ON INTAKE, WEIGHT GAIN, MID-UPPER ARM CIRCUMFERENCE AND HEMOGLOBIN

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ABSTRACT

Maternal mortality problems in pregnant and gave birth women are a major problem in developing countries. The study aimed to identify the influence of nutrition consultation of a balanced diet on macronutrient, weight gain, mid-upper arm circumference (MUAC) and hemoglobin (Hb) level of the first trimester of a pregnant woman in puskesmas of Bengkulu. Pre-experimental research design with one group pretest-posttest was conducted on 32 pregnant women on the first trimester in puskesmas of Bengkulu. The result showed p-value for energy, protein, fat and haemoglobin were 0,089; 0,098; 0,254; 0,743, respectively, which means there is no effect of nutrition consultation on energy intake, protein, fat and Hb. The result on carbohydrate, MUAC and weight gain were 0,004, 0.015 and 0.001 respectively means there were an effect of nutrition consultation on carbohydrate intake, MUAC and weight gain. Manova test results obtained P> 0.05, means there is no difference between the intake of macronutrients (energy, protein, fat, and carbohydrates), weight gain, mid-upper arm circumference (MUAC) and hemoglobin (HB) before and after nutrition consultation on pregnant women in Puskesmas of Bengkulu.

KEYWORDS: Nutrition consultation, pregnant mother, intake of macronutrient, MUAC, hemoglobin level.

INTRODUCTION

Maternal mortality problems in pregnant and gave birth women are a major problem in developing countries. Based on the World Health Organization, 800 women die every day due to pregnancy complications and maternity processes. In Indonesia, the maternal mortality rate is 228 per 100 thousand live births. Maternal mortality in Indonesia is the third highest compared to other countries in ASEAN. This figure is still very far compared to the MDG's target of the Mother's Mortality Rate of 102 per 100,000 live births (WHO, 2013).

The prevalence of Pregnant women with Chronic Energy Deficiency (CED) in Indonesia is 21.6 percent with the lowest prevalence in Riau province (11.8%) and the highest in East Nusa Tenggara (32.4%) and West Papua (30.4%). When viewed by region, the prevalence of pregnant women with CED risk is generally lower in western Indonesia than in eastern Indonesia. In Sumatra region, the highest prevalence of CED risk in Bengkulu province (25.6%), while in Java Bali is the highest in Banten province (27.8%) (Sandjaja, 2009).

First trimester (three months) of pregnancy is the most vulnerable period of the fetus. That's the time that determines whether the fetus will grow up healthy and perfect or imperfect. An incomplete fetus will become an imperfect baby anyway, such as his lips become a cleft or an imperfect heart valve (Miyata & Proverawati, 2010).

Anemia and chronic energy deficiency (CED) is a major cause of bleeding and infection in pregnant women. Maternal Mortality is affected by general health status, education, and care during pregnancy and childbirth (Depkes RI, 2013).

Pregnant women are in need of good nutrition to meet the calories according to their needs. Energy and nutrient requirements during pregnancy were higher than in adults. Chronic malnutrition and anemia in pregnant women can lead to low birth weight (LBW). Low birth weight babies have a greater risk of death than normal-weight babies are born in the neonatal period or in infancy later. Nutritional problems and maternal mortality also greatly affect the infant mortality rate (Shafiq et al., 2007).

Efforts to meet the balanced nutrient intake can be done with increased knowledge to improve their food intake that is with nutritional counseling. Nutrition counseling is the interaction between client and counselor to identify nutritional problems that occur, and seek solutions to the problem (PERSAGI, 2011).

METHOD

A pre-experimental design with one group pretest-posttest design was conducted in 11 Puskesmas (Public Health Center) of Bengkulu city, that are Puskesmas Ratu Agung, Beringin Raya, Ratu Samban, Suka Merindu, Kandang, Padang Serai, Lingkar Timur, Penurunan, Pasar Ikan, Betungan and Basuki Rahmad. The study was conducted from August 2017 to January 2018.

The sample size was 32 pregnant women at the first trimester. data collected were weight taken using bathroom scale, measurement of MUAC using MUAC tape, Hb level using stick hb, Energy intake with 3x24 hour food record, no sequence.

Each sample was given a nutrition consultation of balanced nutrition menu by using booklet, and the example of a balanced diet. after three weeks the respondents measured their weight, MUAC, Hb levels, and 3x24 hour food intake interview.

Processing and analysis of data

Data were analyzed using independent t-test and t-test dependent. Multivariate analysis using MANOVA test. Data processing and Manova t-test were performed using statistic software.

RESULTS

Characteristics of Respondents

Characteristics of respondents in this study discussed age, education, occupation and frequency of pregnancy.

Table 1: Distribution of frequency characteristics of respondents.

Characteristics of respondents	%
Age	
< 20 yr	3,12
20 – 35 yr	81,25
> 35 yr	15,62
Education	
Primary school	12,5
Junior high school	18,75
Senior high school	43,7
College	25
Occupation	
Housewife	75
Official	18,75
Entrepreneur	6,25
Gestation	
First	15,62
Second	40,62
Third	32
More than third	12,5
Total	**100**

Most pregnant women aged 20-35 years (81.25%), Half of respondents had high school education (43.7%).

Most are housewives (75%). Mothers who work as housewives will have more time to access information through electronic media and also participate in community activities, communications, exchanging information and experiences between mothers.

Intake of Macronutrients, MUAC and Hemoglobin Before Counseling

In the study of pregnant women with a sample of 32 people trimester 1 pregnant women in average macro nutrient, nutritional status of pregnant women and hemoglobin levels before and after treatment, can be seen in table 2.

Table 2: Macronutrients intake, nutritional status and hemoglobin levels of trimester 1 pregnant women before counseling.

Variabel	Mean	SD
Energy	1469,19	460
Protein	54,66	19,47
Fat	53,12	20,97
Carbohydrate	195,34	64,36
MUAC	26,82	3,29
Weight	53,63	12,64
Hemoglobin	10,91	1,22

The average energy intake of 3x24 hours of pregnant women before the intervention were 1469.19 calories, 54.66 grams of protein, fat 53.12 gr, carbohydrate 195.34 gr. The average of MUAC was 26.82 cm, the average weight was 53.63 kg and hemoglobin (Hb) level was 10.91 g / dl.

Intake of Macro Nutrition, Nutritional Status of Pregnant Women Trimester 1 and Hemoglobin Level After Counseling

The intake of Macronutrients, nutritional status of pregnant women and hemoglobin levels after counseling described below.

Table 3: Intake of macronutrients, nutritional status and hemoglobin levels of pregnant women after counseling.

Variabel	Mean	SD
Energy	1634,06	533,48
Protein	60,66	24,86
Fat	56,72	26,02
Carbohydrate	225,31	81,85
MUAC	27,07	3,31
Weight	55,01	11,85
Hb	10,75	1,01

The average energy intake of pregnant women after counseling was 1634,06 calories, protein was 60,66 gr, fat was 56,72 gr, and carbohydrate was 225,31 gr. The average of mid upper arm circumference (MUAC) after counseling was 27.07 cm, body weight was 55.01 kg and hemoglobin (Hb) level was 10.75 gr / dl.

The Effect of Balanced Nutrition Consultation on Macronutrients Intake

In the study of 32 pregnant women in Puskesmas (community health center) of Bengkulu city, the influence of balanced nutrition consultation on macronutrients intake described below.

Table 4: Effect of balanced nutrition consultation on macro nutrition intake.

Variabel	n	*Pre*	*Post*	*p-value*
Energy	32	1469,19 ± 460	1634 ± 533,48	0,089
Protein	32	54,66 ± 19,47	60,66 ± 24,86	0,098
Fat	32	53,12 ± 20,97	56,72 ± 26,02	0,254
Carbohydrate	32	195,34 ± 64,36	225,31 ± 81,85	0,004

Shapiro-Wilk test results showed that the distribution of the data intake of energy, protein, fat and carbohydrates are not normal. Data of wilxocon signed ranks test were 0.089 for energy, protein was 0.098 and fat was 0.254, which means there is no effect of nutritional consultation of balanced menu to the intake of energy, protein and fat. Results of wilxocon signed ranks test on carbohydrates was 0.004, so there is an effect of nutritional consultation on carbohydrate intake.

The Effect of Balanced Nutrition Consultation on Mid Upper Arm Circumference and Weight Gain

The influence of balanced nutrition consultation on mid upper arm circumference and weight gain in table 5.

Table 5: Effect of balanced nutrition consultation on MUAC and weight gain.

Variable	n	*Pre*	*Post*	*p-value*
MUAC	32	26,821 ± 3,29	27,07 ± 3,31	0,015
Weight gain	32	56,63 ± 12,64	55,01 ± 11,85	0,001

Data from t-test analysis results dependent, obtained each having a p-value was 0.015 and 0.001 which p <0,05, which means there is an effect of nutrition consultation of balanced menu to MUAC and weight gain.

The Effect of Balanced Nutrition Consultation on Hemoglobin (Hb)

The influence of consultation on pregnant women's Hb level in table 6.

Table 6: Effects of consultation on hemoglobin (Hb).

Variable	n	*Pre* Mean ± SD	*Post* Mean ± SD	*p-value*
Hb	32	10,91 ± 1,22	10,75 ± 1,01	0,743

Results of analysis of wilxocon signed ranks test, p value is 0.743 where p> 0.05, which means there is no influence of nutritional consultation on hemoglobin (Hb).

Differences Before and After Nutrition Consultation on Macro Nutrien, Weight Loss, MUAC, and Hb Levels

In the result of the difference before and after consultation nutritional balanced menu of the macro-nutrients, weight, MUAC and Hb.

Table 7: Differences before and after consultation on macro nutrients, weight, MUAC.

Variable	N	*p-value*
Energy	32	0,190
Protein	32	0,287
Fat	32	0,545
carbohydrate	32	0,109
MUAC	32	0,760
Weight gain	32	0,655
Hb	32	0,581

Manova test results obtained P> 0.05, this means there is no difference between the intake of macro nutrients (energy, protein, fat, and carbohydrates), weight gain, upper arm circumference (LILA) and hemoglobin (HB) before and after nutrition nutrition consultation on pregnant women in the Puskesmas of Bengkulu City.

DISCUSSION

Intake of Macro Nutrient, Nutritional Status and Hemoglobin Levels Before Counseling

Food intake affects the nutritional status of a person. Poor maternal nutrition before pregnancy and during pregnancy may cause intrauterine growth retardation (IUGR), babies born with low birth weight (LBW), impaired growth and development of the infant brain as well as increased risk of morbidity and mortality (Sekartika, 2013). A healthy diet should be ensured though before she became pregnant due to maternal nutrition are important factors that affect fertility, pregnancy, complications of pregnancy (Department of Nutrition and Public Health, 2011).

Intake of Macro Nutrition, Nutritional Status and Hemoglobin Level after Counseling

The body requires energy for the ongoing physiological processes, such as muscle contraction, the formation and delivery of nerve impulses, glandular secretions, and various other synthesis and degradation reactions, and energy is also required to perform various work of the body one of which is the body's work in the metabolism of various nutrients. In case of lack of energy both quantitatively and qualitatively, the working capacity of the body to be disturbed so that it will happen demolition protein reserves in the body (Mentika, 2014).

According to Murray et al. (2009) The function of proteins in the body is to help non-heme iron to be more easily absorbed in the body, sulfur groups contained in proteins have a booster effect in which this group binds non-heme iron and helps its absorption in the body of amino acids present in the source animal foods. Inadequate protein intake may lead to impaired iron metabolism that may affect hemoglobin formation, leading to anemia. Fat is needed for the formation of new cells and the development of the fetal nervous system. Pregnant women are advised to consume foods containing no more than 25% of the total calories consumed during the day. Ordinary fat obtained from saturated fatty acids that are generally derived from animal and unsaturated fatty acids derived from vegetable. Unsaturated fatty acids such as linoleic and DHA Omega-3 is known to about 50% is needed for brain tissue and DHA (Syariffudin, 2013).

Less food intake will lead to malnutrition that will affect the rate of hemoglobin formation and blood concentration decreased causing anemia. If food intake is inadequate, then the iron available is insufficient for the synthesis of hemoglobin due to iron deficiency in the diet, although erythrocytes still be produced in the usual amount but its content is lower than normal and is smaller so less able to carry oxygen (Nurhidayati, 2014).

In this study the nutrients consumed by pregnant women on average less (54,66 gram) than requirement so that will influence the hemoglobin level of pregnant mother (10,91 gr / dl) so that will impact to the physical state of the pregnant woman. As a result of anemia can be a major cause of bleeding and infection in pregnant women and LBW in infants to be born.

The Effect of Consultation on Macro Nutrition Intake

The level of energy consumption, increased protein and fat intake, although not statistically significant. Average energy increase of 164,81 calories, protein 6 gr, fat 3,6 gr. This is consistent with other studies stating that nutritional counseling helped pregnant women in the second trimester of pregnancy in the treatment group to increase energy intake significantly (Napzah, 2013). In line with research in Makassar, which states that the provision of nutrition education for the respondents indicated an increased intake in some types of nutrients while not yet at the AKG pregnant women (Adi, 2012).

This study are consistent with previous studies that the provision of nutrition education can improve nutrient intake of pregnant women in this study primarily on nutrient intake of Carbohydrates pregnant women.

The Effect of Consultation on Nutritional Status (MUAC) and Weight Gain

The results of this study showed that mothers who received nutritional counseling had higher knowledge and energy consumption than pregnant women who did not get counseling. In addition, pregnant women who get counseling experience weight gain (4.1 kg) and LiLA (1.58 cm) higher than those who did not get nutrition counseling.

This study is in line with the research conducted by Yuniarti (2000) showed that there is a relationship between nutritional counseling to nutritional intake, energy consumption, and nutritional status of pregnant women based on LiLA and weight gain during pregnancy. The results of this study showed that mothers who received nutritional counseling had higher knowledge and energy consumption than pregnant women who did not get counseling. In addition, pregnant women who get counseling have additional body weight (4.1 kg) and LiLA (1.58 cm) higher than those who did not get nutrition counseling.

The Effect of Consultation on Hemoglobin (Hb)

The results of this study are in line with the study of Salmiah et al. (2013), which states that there is an increase in protein and iron intake in the intervention and sample groups, but this increase does not cause pregnant women's hb levels to rise ($p > 0.05$). This is due to Hb levels not only by the intake of protein and iron, but also given by the presence of metabolic disorders in the absorption, the presence of infectious diseases and disobedience of pregnant women in consumed iron tablets (Salmiah, 2013).

According to Sayogo (2007), iron nutrients (Fe) is a group of minerals needed, as the core of hemoglobin, the main element of red blood cells. The function of red blood cells is important given the task, among others, as a means of transportation of nutrients, and especially also oxygen needed in physiological and biochemical processes in every body tissue.

Protein sources commonly consumed by respondents are a source of vegetable protein from a group of food nuts, vegetables and dairy products. As it is known that vegetable food is a source of non-heme iron, in the absorption of non-heme iron is lower than the source of heme iron. Types of vegetables that are widely consumed are spinach and kale. Spinach and kale are good sources of iron. However, the absorption of the body in iron from non heme food includes low ie 1% - 6%.

The group of side dishes most often consumed by respondents is tofu and tempeh. Soy protein can generally inhibit the absorption of iron because of the phytate. However, in some fermented soy products such as tempe and soy sauce can increase iron absorption. Another type of side dish that comes from animal protein and preferably respondents are fish and chicken eggs. Albumin in chicken eggs can inhibit the absorption of iron, especially iron non-heme so that iron from eggs only absorbed low.

The most preferred fruit by pregnant women is bananas. Banana is a good fruit consumed for pregnant women contain vitamin C but vitamin C contained in bananas are low compared to citrus fruit or guava.

Most respondents chose tea as a beverage that most frequently consumed. This could result in not good for the absorption of iron because tea contains tannin which can inhibit iron absorption (Arisman, 2004). Other kinds of drinks consumed is milk. This habit is quite good because milk contains many minerals and vitamins needed for fetal growth in the womb.

Differences Before and After Counseling on Macro Nutrients, Weight Loss, MUAC, and Hb
Nutrition monitoring is useful as an overview of changes in nutritional status over time (Arisman, 2009). Through nutritional monitoring that can describe nutritional status, mothers can pay attention and plan a balanced diet that varies and has the various nutritional values needed during pregnancy.

This study showed there were no effect of nutritional counseling of a balanced diet before and after the consultations on MUAC and weight gain.

CONCLUSION

There was no significant effect of counseling of balanced diet on intake of energy, protein, fat, hemoglobin (Hb) level. There were significant effect on carbohydrate, MUAC and weight gain. there was no difference between the intake of macro nutrients (energy, protein, fat, and carbohydrates), weight gain, MUAC and hemoglobin (HB) before and after nutrition nutrition counseling on pregnant women at first trimester in the work area of Puskesmas of Bengkulu City.

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