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Improving Nutritional Status During Pregnancy through Preconception Nutrition Education

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KEYWORDS

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ABSTRACT:

The most prevalent nutritional problems among pregnant women in Indonesia are anemia and malnutrition during pregnancy. One in two pregnant women experiences anemia during this period. The objective of this research is to assess the impact of providing education about fulfilling preconception nutrition to prospective brides on nutritional status during the 1st trimester of pregnancy. Nutritional education will be provided during the preconception period using a module three times, and the impact on nutritional status during pregnancy will be assessed. The research method employed is quasi-experimental, with the sample consisting of prospective brides and grooms in Depok City, totaling 100 people. The results of the research, based on the T-test and General Linear Model analysis, showed that in the group given the intervention, there was an average increase in nutritional status across three indicators: hemoglobin levels increased by 1.64 g/dL, body mass index increased by 2.51 kg/m2, and middle upper arm circumference increased by 0.51 cm. In contrast, the three indicators in the control group tended to decrease on average. In conclusion, this research indicates that providing education on fulfilling pregnancy nutrition to prospective brides has an impact on food consumption behavior and improves nutritional status, specifically increasing hemoglobin levels, body mass index, and middle upper arm circumference. It is crucial to emphasize providing education on nutritional preparation for pregnancy to prospective brides during the preconception period as a strategic and initial step in preventing nutritional deficiencies during pregnancy.

1. INTRODUCTION

Adequate nutritional status during pregnancy needs to be considered because it will have a big influence on the child's growth and development. The pregnancy period is one of the short critical periods of human growth and development (window of opportunity); Other periods are the period before conception (future mothers, young women), the breastfeeding period (breastfeeding mothers), and the infant/child period 0-2 years. Malnutrition that occurs during this period will cause initial damage to health, brain development, intelligence, school ability and production capacity that is permanent and cannot be repaired. In pregnant women, if the fetus in their womb is malnourished, then their child as an adult will be at higher risk of suffering from degenerative diseases (diabetes, hypertension, heart disease, stroke) compared to those who do not experience malnutrition [1].

In general, babies do not depend on their mother's diet during pregnancy. Baby takes nutrients from the mother's stores, and replaces protein and fat inside tissue, which is related to the mother's body composition. Nutritional status before pregnancy is very important to ensure the availability of nutritional stores. A baby will be born with all the eggs it will have in its lifetime. The quality of the eggs reflects the nutritional status of the mother. The quality of ovum will become a grandchild, determined by the nutritional status of the grandmother. This is the basic 100 year nutritional flow because it involves 3 generations in relation to the risk of non-communicable disease [2].

The prevalence of CED in pregnant women aged 15-19 years is 33.5%, while pregnant women aged 20-24 years 23.3% and aged 25-29 16.7% [3]. Based on PSG in 2016, 53.9% pregnant women experienced an energy deficit (<70% AKE) and 13.1% experienced a mild

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deficit (70-90% AKE). Protein adequacy, 51.9% of pregnant women experience protein deficit (<80% AKP) and 18.8% experienced mild deficits (80-99% AKP) (4). Anemia in pregnant women prevalence is 48.9%, at ages 15-24 years it is 84.6%, while at ages 25-34 years 33.7%. The incidence of anemia in women of childbearing age is the closest group with the period of pregnancy, the highest incidence rate is at the age of 15-24 years with prevalence 32% [4]. Health services during the pre-pregnancy period are regulated in the Minister of Health Regulation Number 97 of 2014. One thing that is done is checking nutritional status intended to overcome the problems of Chronic Energy Deficiency and Anemia [5].

2. METHOD

Quantitative Research to intervene in a given group intervention with the expected output is an analysis of the effectiveness of the module in education and improving the nutritional status of the prospective bride. This stage research was carried out to assess differences in knowledge, attitudes, behavior, food intake, Hb levels and BMI in the group that was given intervention through the module and which was not given intervention with modules. This stage of research was carried out by Quantitative Research with Quasi Experimental design with Nonequivalent Control Group method. The population in this study were all prospective brides who did Premarital Health Examination at the Health Center in Depok City. Sample taken with purposive sampling technique with the following criteria :

Inclusion Criteria:

1) Women in Reproductive Health aged 20 to. 35 years old
2) Do not have a history of diseases that exacerbate anemia and nutritional intake
3) Examination maximum 3 months before the wedding
4) The prospective bride and groom do not delay the pregnancy program

Exclusion Criteria:

1) Can't read yet
2) Not conducting a complete premarital reproductive health examination

Drop Out Criteria:

1) Experiencing serious illness to be treated in hospital
2) Move domicile outside the city of Depok during the study period
3) Not pregnant during the study period

In this study, researchers used calculations using applications WHO sample size by citing related research samples [6]–[9]. Based on these calculations the largest number of samples was taken from the research of Hesti Permata Sari et al. About Nutrition Education, Hemoglobin Levels, and Nutrition Knowledge of Adolescent Girls in Banyumas District [10].

Total sample of 2 groups: 41 x 2 = 82 sample people

20% Drop Out Criteria: 20% x 82 = 16.4

Total Samples = 98.4 then rounded up to 100 samples, consisting of; 50 sample intervention group and 50 samples of the control group.

The location selection above is based on geography to prevent contact between the intervention group and the control group and the distribution of the incidence of anemia and CED in Pregnant Women. The research locations are 10 Community Health Centers, which will be selected according to quota, namely if the minimum number of samples in each group has been met then the sampling process will be stopped.

In general, the implementation of the intervention can be as follows:

a. Providing education by means of counseling using the Catin Health Card media for the control group and the Catin Health Card and Education Module for the group intervention
b. Length of education provided by the team + 15 minutes for the Catin Health Card and + 30 minutes for education on the Catin Health Card and Education Module
c. Providing education to the control group once during pre-marital screening, and providing education in the intervention group 3x in 3 weeks followed by monitoring through a digital module The data that has been collected will be analyzed using the Dependent T Test, Independent T Test and GLM.

3. RESULTS AND DISCUSSION

The following are the results of research conducted with respondents who were prospective brides and grooms who underwent pre-marital health checks at the Depok City Regional Health Center.

3.1. Description of Respondent Characteristics and Homogeneity of Respondents in the Intervention Group and Control Group

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Table 1. Characteristics of Respondents and Homogeneity of Respondents in Intervention Groups and Control Groups

No.	Variable	Intervention Groups		Control Groups		p - *value*
		N	%	N	%	
1	Ages :					
	a. 20 – 25 years	16	32.0	10	20.0	
	b. 25 – 30 years	28	56.0	31	62.0	0.659
	c. 30 – 35 years	6	12.0	9	18.0	
2	Works :					
	a. Not Working (homework assisted by assistant)	2	4.0	1	2.0	
	b. Housewife	13	26.0	16	32.0	
	c. College (Student)	4	8.0	2	4.0	
	d. Private employees	21	42.0	22	44.0	0.559
	e. Teacher	1	2.0	3	6.0	
	f. Trade	5	10.0	4	8.0	
	g. Managing Online Stores	4	8.0	2	4.0	
3	Body mass index					
	a. <18,5 kg/m^2	7	14.0	8	16.0	
	b. 18,5 – 24,9 kg/m^2	32	64.0	29	58.0	0.623
	c. >24,9 kg/m^2	11	22.0	13	26.0	
4	Hemoglobin levels					
	a. $\geq$ 12 gr/dL	18	36.0	17	34.0	
	b. 11- 12 gr/dL	23	46.0	29	58.0	0.449
	c. <11 gr/dL	9	18.0	4	8.0	
5	Upper arm circumference					
	a. $\geq$ 23,5 cm	39	78.0	40	80	0.691
	b. < 23,5 cm	11	22.0	10	20	

Table 1 above illustrates the distribution of respondents based on age, with the majority aged between 25 and 30 years, both in the intervention group at 56% and the control group at 62%. In terms of employment, the majority were private employees, as many as 42% in the intervention group and 44% in the control group. Based on the Body Mass Index, the highest was 18.5 - 24.9 kg/m2 with 64% in the intervention group and 58% in the control group. Based on the highest hemoglobin level, it was 11-12 gr/dL with a percentage of 46% in the intervention group and 58% in the control group. And based on upper arm circumference, the highest number was > 23.5 cm with a percentage of 78% in the intervention group and 80% in the control group.

In the homogeneity test (equality) between respondents in the intervention group and the control group based on the variables age, occupation, Body Mass Index, Hemoglobin Level, and Upper Arm Circumference, there were no significant differences in the characteristics of the respondent group in both the intervention group and the control group., which is proven by the homogeneity test of all respondent characteristic variables resulting in a p value > 0.05.

3.2. Differences in Food Intake Assessment in the Intervention Group and Control Group

The food consumed by respondents in this study was screened, including not having a history of diseases that worsen anemia such as liver damage, kidney failure, cancer, and so on. Apart from that, he also does not have a history of diseases that affect nutritional intake, such as disorders of the digestive tract, acute diarrhea, infectious diseases and so on. All respondents had no history of illness or disease that could interfere with food consumption or absorption.

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The following are the differences in food intake assessments carried out by respondents in the intervention group and the control group in the pretest and posttest assessments.

Table 2. Differences in Respondents' Food Intake Assessments in the Intervention Group and Control Group

Food Intake	Intervention Groups		Control Groups		p value Independent
	Mean	SD	*Mean*	SD	
Pre-Test Assessment	1946	264.5443	1977	248.6617	
Post-Test Assessment	1948	277.6009	1925	262.2995	0.048
p value Paired Test	0.00		0.053		

The table above shows the differences in food intake during the pre-test assessment and post-test assessment. In the analysis of differences in pre and post test scores, the results obtained in the intervention group were a p value of 0.00 (p value <0.05), this shows that there was a significant difference before and after being given the intervention, whereas in the control group the p value was 0.053 (p value >0.05). This shows that there is no significant difference in the control group in the pre-test and post-test assessments. In the assessment between groups, the result was a p value of 0.048 (p value >0.05), meaning that there was no significant difference in the assessment of food intake between the intervention group and the control group.

3.3. Differences in Knowledge in the Intervention Group and Control Group

The following is the difference in the knowledge assessment of respondents in the intervention group and the control group in the pretest and posttest assessments.

Table 3. Differences in Respondents' Knowledge Assessments in the Intervention Group and Control Group

Knowledge	Intervention Groups		Control Groups		p value Independent
	Mean	SD	*Mean*	SD	
Pre-Test Assessment	39.53	14.56	48.12	13.38	0.00
Post-Test Assessment	65.65	16.78	49.53	17.63	
p value Paired Test	0.00		0.408		

The table above shows that there are differences in knowledge during the pre-test assessment and post-test assessment. In the analysis of differences in pre and post test scores, the results obtained in the intervention group were a p value of 0.00 (p value <0.05), this shows that there was a significant difference before and after being given the intervention, whereas in the control group the p value was 0.408 (p value >0.05). This shows that there is no significant difference in the control group in the pre-test and post-test assessments. In the assessment between groups, the result was a p value of 0.000 (p value >0.05), meaning that there was a significant difference in the knowledge assessment between the intervention group and the control group.

3.4. Differences in Attitude Assessments in the Intervention Group and Control Group

The following is the difference in the attitude assessment of respondents in the intervention group and the control group in the pretest and posttest assessments.

Table 4. Differences in Attitude Assessments in the Intervention Group and Control Group

Attitude	Intervention Groups		Control Groups		p value Independent
	Mean	SD	*Mean*	SD	
Pre-Test Assessment	29.82	6.41	31.08	7.33	0.011
Post-Test Assessment	34.56	6.93	30.78	7.56	
p value Paired Test	0.00		0.486		

The table above shows that there are differences in attitudes during the pre-test assessment and post-test assessment. In the analysis of differences in pre and post test scores, the results obtained in the intervention group were a p value of 0.00 (p value <0.05), this shows that there was a significant difference before and after being given the intervention, while in the control group the p value was 0.486 (p value >0.05). This shows that there

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is no significant difference in the control group in the pre-test and post-test assessments. In the inter-group assessment, the result was a p value of 0.011 (p value <0.05), meaning that there was a significant difference in the attitude assessment between the intervention group and the control group.

3.5. Differences in Dietary Behavior Assessments in the Intervention Group and Control Group

The following is the difference in the Behavior Assessments of respondents in the intervention group and the control group in the pretest and posttest assessments.

Table 5. Differences in Dietary Behavior Assessments in the Intervention Group and Control Group

Dietary Behavior	Intervention Groups		Control Groups		p value Independent
	Mean	SD	*Mean*	SD	
Pre-Test Assessment	70.78	10.24	71.02	10.30	0.029
Post-Test Assessment	77.54	13.14	72.22	10.73	
p value Paired Test	0.00		0.112		

The table above shows that there are differences in dietary behavior during the pre-test assessment and post-test assessment. In the analysis of differences in pre and post test scores, the results obtained in the intervention group were a p value of 0.00 (p value <0.05), this shows that there was a significant difference before and after the intervention was given, while in the control group the p value was 0.112 (p value >0.05). This shows that there is no significant difference in the control group in the pre-test and post-test assessments. In the inter-group assessment, the result was a p value of 0.029 (p value <0.05), meaning that there was a significant difference in the assessment of dietary behavior between the intervention group and the control group.

3.6. Differences in Physical Activity Assessments in the Intervention Group and Control Group

The following is the difference in physical activity of respondents in the intervention group and the control group in the pretest and posttest assessments.

Table 6. Differences in Physical Activity Assessments in the Intervention Group and Control Group

Physical Activity	Intervention Groups		Control Groups		p value Independent
	Mean	SD	*Mean*	SD	
Pre-Test Assessment	2557.20	599.03	2645.60	665.94	0.519
Post-Test Assessment	2462.80	596.47	2546.40	691.31	
p value Paired Test	0.01		0.021		

The table above shows that there are differences in physical activity during the pre-test assessment and post-test assessment. In the analysis of differences in pre and post test scores, the results obtained in the intervention group were p value 0.01 (p value <0.05), this shows that there was a significant difference before and after being given the intervention, while in the control group p value was 0.021 (p value <0.05). This shows that there are also significant differences in the control group in the pre-test and post-test assessments. In the assessment between groups, the result was a p value of 0.519 (p value >0.05), meaning that there was no significant difference in the assessment of physical activity between the intervention group and the control group.

3.7. Differences in Body Mass Index Assessments in the Intervention Group and Control Group

The following is the difference in Body Mass Index of respondents in the intervention group and the control group in the pretest and posttest assessments.

Table 7. Differences in Body Mass Index Assessments in the Intervention Group and Control Group

Body Mass Index	Intervention Groups		Control Groups		p value Independent
	Mean	SD	*Mean*	SD	
Pre-Test Assessment	22.14	3.27	22.27	3.34	0.045
Post-Test Assessment	24.65	3.62	23.32	3.24	
p value Paired Test	0.001		0.059		

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The table above shows the differences in BMI during the pre-test assessment and post-test assessment. In the analysis of the differences in pre and post test scores, the results obtained in the intervention group were p value 0.01 (p value <0.05), this shows that there was a significant difference before and after being given the intervention, whereas in the control group the p value was 0.059 (p value >0.05). This shows that there is no significant difference in the control group in the pre-test and post-test assessments. In the assessment between groups, the result was a p value of 0.045 (p value <0.05), meaning that there was a significant difference in the BMI assessment between the intervention group and the control group.

3.8. Differences in Hemoglobin Levels Assessments in the Intervention Group and Control Group

The following is the difference in Hemoglobin Levels of respondents in the intervention group and the control group in the pretest and posttest assessments.

Table 8. Differences in Hemoglobin Levels Assessments in the Intervention Group and Control Group

Hemoglobin Levels	Intervention Groups		Control Groups		p value Independent
	Mean	SD	*Mean*	SD	
Pre-Test Assessment	11.46	1.42	11.74	1.06	0.0162
Post-Test Assessment	11.80	1.72	11.69	1.64	
p value Paired Test	0.015		0.814		

The table above shows the differences in Hb levels during the pre-test assessment and post-test assessment. In the analysis of differences in pre and post test scores, the results obtained in the intervention group were a p value of 0.015 (p value <0.05), this shows that there was a significant difference before and after being given the intervention, whereas in the control group the p value was 0.814 (p value >0.05). This shows that there is no significant difference in the control group in the pre-test and post-test assessments. In the assessment between groups, the result was a p value of 0.0162 (p value >0.05), meaning that there was a significant difference in the assessment of Hb levels between the intervention group and the control group.

3.9. Differences in Middle Upper Arm Circumference Assessments in the Intervention Group and Control Group

The following is the difference in Upper Arm Circumference of respondents in the intervention group and the control group in the pretest and posttest assessments.

Table 9. Differences in Upper Arm Circumference Assessments in the Intervention Group and Control Group

Middle Upper Arm Circumference	Intervention Groups		Control Groups		p value Independent
	Mean	SD	*Mean*	SD	
Pre-Test Assessment	24.81	2.45	24.95	2.51	0.442
Post-Test Assessment	25.32	2.42	24.93	2.62	
p value Paired Test	0.052		0.77		

The table above shows the differences in Lila during the pre-test assessment and post-test assessment. In the analysis of differences in pre and post test scores, the results obtained in the intervention group were a p value of 0.052 (p value > 0.05), this shows that there was no significant difference before and after being given the intervention, whereas in the control group the p value was 0.77 (p value > 0.05) This also shows that there is no significant difference in the control group in the pre-test and post-test assessments. In the inter-group assessment, the result was a p value of 0.442 (p value >0.05), meaning that there was no significant difference in the level of knowledge between the intervention group and the control group.

3.10. Effect of Increasing Knowledge, Attitudes and Dietary Behavior on Nutritional Status

The results of the General Linear Model test generally show differences in the average nutritional status assessment consisting of BMI, Hb and LIA assessments. In the intervention group there was an increase of 11.35% in BMI, 2.97% in Hb, and 2.06% in Lila. In the control group there was an increase in BMI of 4.72%, a

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decrease in Hb of 0.38%, and a decrease in LIA of 0.07%.

In accordance with the target of providing an educational model using modules, it is to improve the nutritional status of pregnant women, so that the period between prospective brides and grooms until before pregnancy can be used to prepare optimally for pregnancy.

Tabel 10. Analysis of the Influence of Food Intake, Knowledge, Attitudes on Nutritional Status

Variable	P value		
	BMI	Hb Level	UAC
Food supply	0.129	0.013	0.081
Knowledge	0.048	0.041	0.096
Attitude	0.051	0.049	0.067
Dietary Behavior	0.037	0.001	0.023
Physical Activity	0.257	0.759	0.982

Table 10 shows that food intake only influences Hb, while knowledge can influence BMI and Hb, while attitude influences Hb. Behavior influences all three indicators of nutritional status, and physical activity influences only BMI. This proves that in general providing education will improve nutritional status from various aspects of indicators. In the assessment, R^2 = 0.211 for the food intake variable, R^2 = 0.12 for the knowledge variable, and R^2 = 0.010 for attitude. The assessment of R^2 = for dietary behavior is 0.421 and R^2 = - 0.387 for the physical activity variable. This shows that the greater the food intake, knowledge, attitudes and dietary behavior, the better the nutritional status, and the greater the decrease in physical activity, the lower the nutritional status.

4. DISCUSSION

Several studies in Indonesia related to the effect of education on food intake include effective education in increasing knowledge, attitudes, levels of iron adequacy, and compliance with the consumption of blood supplement tablets in pregnant women [11]–[15]. Other research states that there is a significant influence of nutrition and reproductive health education on the knowledge and attitudes of prospective brides [16]–[20]. Regarding intake, other research shows that there is a change in the knowledge and attitudes of prospective brides and grooms after being given nutrition education. On average, respondents have started to improve their diet to prepare for pregnancy based on the previously provided nutrition education [21]–[26].

In terms of knowledge, other research also indicates differences in the knowledge and attitudes of prospective brides before and after receiving counseling about preconception nutrition [27]–[32]. Additional research shows a relationship between the level of knowledge of the prospective bride and groom and pregnancy preparation, emphasizing the importance of good nutritional status, a healthy lifestyle, and access to reliable information [33]. Providing education to prospective brides and grooms is not only useful in efforts to improve nutritional status, but it is also an endeavor to optimize the preconception period, allowing them to plan for a healthy pregnancy.

5. CONCLUSION

This research demonstrates that providing education through the Educational Model using the Healthy Pregnancy Module for prospective brides can generally increase Body Mass Index, Hb Levels, and Upper Arm Circumference during the first trimester of pregnancy, with the highest increase observed in Body Mass Index. In the control group, there was an increase in Body Mass Index, but there was a decrease in Hemoglobin levels and Upper Arm Circumference. Therefore, providing education about a Healthy Pregnancy to prospective brides can be an effective effort to enhance nutritional status during pregnancy.

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