The effect of family empowerment on hemoglobin levels in pregnant women

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principles of information to consent, respect for human rights, beneficence, and non-maleficence.

Abstract

Empowering families can enhance their ability to detect high-risk pregnancies early, which can improve the health status of pregnant women. This study aimed to analyze the effect of the family empowerment model on the hemoglobin levels of pregnant women. It employed a quasi-experimental method with a cross-sectional study approach, implementing a family empowerment intervention to examine its impact on the health of pregnant women. Sampling was conducted using probability sampling with simple random sampling, resulting in 60 pregnant women divided equally into an intervention group and a control group. The independent variable was the family empowerment model intervention, and the dependent variable was the hemoglobin level of the pregnant women. Data were collected using a questionnaire and analyzed with the Wilcoxon test statistic, which indicated a significant effect ($p=0.000$) of the family empowerment model on the hemoglobin levels of pregnant women. The statistical analysis revealed that the intervention group's hemoglobin levels showed a significant difference ($p<0.05$) before and after the intervention. In summary, the treatment

involving the family empowerment model significantly affected the hemoglobin levels in pregnant women. After the intervention, nearly all respondents demonstrated increased family involvement in maintaining and caring for pregnant women, facilitating the early detection of high-risk pregnancies, and contributing to increased hemoglobin levels among these women.

Introduction

Pregnancy and childbirth are physiological processes experienced by women, but sometimes they involve risky conditions.[1] The risk of pregnancy complications can affect any pregnant woman, highlighting the importance of providing physical and mental support, along with family involvement, to ensure her well-being throughout the pregnancy.[2] Family members are the closest individuals to pregnant women and can assist in recognizing signs of danger or issues that may arise.[3] Empowering family members to actively participate in supporting pregnant women can enhance their ability to practice self-care and take responsibility for the health of both the mother and the high-risk pregnancy.[4]

The results of a preliminary study of 20 people showed that 80% (16 people) of the family in this case were husbands, did not know and were unable to recognize the signs and symptoms that pregnant women were in the risk category or not, did not know how to do early detection of pregnancy with using the Maternal and Child Health (MCH) book and KSPR (*Kartu Skor Pudji Rochyati* or Pudji Rochyati Score Card), do not understand what to do if there is an emergency and have not determined who is the main decision maker and there is no planning to prepare funds, where to choose health facilities (clinics, primary health care or hospital), as well as the transportation to be used in case of complications.

Family ignorance about the high risk of pregnancy due to the lack of optimal education and assistance by health workers is one of the causes of the inability of families to carry out early detection and treatment of high-risk pregnancies[5] which can have an impact on increasing the

danger of pregnancy which affects the health status of the mother and her baby.[6] Support obtained from the family or husband is very important in recognizing the symptoms and responses felt by pregnant women,[7] can reduce anxiety and complications in pregnancy,[8] including in making decisions to seek delivery assistance and management of obstetric complications.[9]

Hemoglobin levels are crucial in pregnant women as they play a key role in transporting oxygen throughout the body, supporting both maternal and fetal health.[10] Adequate hemoglobin levels help prevent anemia, a common condition in pregnancy that can lead to severe fatigue, preterm delivery, and low birth weight.[11] Therefore, understanding the impact of family empowerment on improving hemoglobin levels can provide valuable insights into effective strategies for enhancing prenatal care and maternal well-being.

Therefore, this study aimed to analyze the effect of the family empowerment model on the hemoglobin levels of pregnant women.

Materials and Methods

Research design

This type of research was quasi-experimental. The purpose of this study was to conduct a model simulation to test the effectiveness of the family empowerment model. Quasi-experimental research was conducted with pre-test and post-test after the model was tested. Two groups will be involved in this study, namely the treatment group and the control group.

Study participants

The population of pregnant women in the working area of the Wonokromo Health Center is 128 pregnant women. Then, it was categorized into a homogeneous sample of 70 people. With the criteria of pregnant women who have entered the second trimester during the data collection

period, pregnant women who live in their area of residence for at least 3 months, planning to give birth in the area of their current residence. After calculating the sample obtained from 60 people, the sample size of the second research phase for each group was 30 respondents from the intervention group and 30 respondents from the control group by random sampling.

Variable, instrument and data collection

The family empowerment intervention was carried out by home visits, which were carried out in as many as 8 sessions for 8 weeks with a duration of ±60-120 minutes through home visits. The methods used are lectures, discussions (questions and answers), demonstrations, contextual counseling, and adult learning with an active learning process using interactive learning media through booklet media, learning modules, KSPR scores, DRISK applications, and MCH books. At the end of each meeting, the researcher asked the respondents again about the material that had been presented. After the last intervention, the researcher will then conduct a post-test in the treatment group and the control group by asking the family to fill out a questionnaire on the ability to perform early detection of high-risk pregnancies and measure the Hemoglobin levels of pregnant women. The collected data is then analyzed. After taking the post-test data, it is to fulfill the principle of fairness in research ethics. Then the researcher will also provide the same intervention to the control and treatment groups.

Data analysis

The research data were analyzed using the Wilcoxon statistical test which showed ($p=0.000$). This means that the family empowerment model has an effect on hemoglobin levels.

Ethical clearance

Ethical considerations played a pivotal role throughout the research process. The study garnered ethical clearance from the Health Research Ethics Commission, Faculty of Nursing,

Universitas Airlangga, based on ethical certificate No. Certificate :172-KEPK, thereby attesting to its unwavering commitment to upholding ethical standards and guidelines.

Results

Table 1 present the majority of husbands in the control group are 26-45 years old, with the last education of middle school, working in the private sector, while most of the wives are 17-25 years old, with the last education of middle school, not working, and the third pregnancy. The result of the average KSPR score is 5.20 with a standard deviation of 5.18885 and the lowest score of 2, while the highest is 18. In the intervention group, most of the husbands were aged 26-45 years, with the latest secondary education, working in the private sector, while the wives were mostly 17-25 years old, with secondary education, not working, and at the first pregnancy. The average KSPR score is 3.60 with a standard deviation of 3.08053 and has the lowest value of 2, while the highest is 14. Furthermore, from the different tests, it is known that the p-value above 0.05 indicates that there is no difference in the characteristics of the respondents between the treatment groups. with the control group.

Table 2 shows a description of Hemoglobin levels from the results of the pre-test and post-test in the control group. The results were the same, namely that most of the respondents were not anemic. In the intervention group before being given treatment, most of the respondents had moderate anemia category 6.7% and 26.7% mild. And after being given treatment there was an increase in non-anemic changes from 66.7% to 80%.

Table 3 shows the testing results of pregnant women's hemoglobin levels in family empowerment development research. The results of the statistical test analysis of the intervention group on hemoglobin levels resulted in a significance value of <alpha (5% or 0.05). Therefore, it can be stated that there is a significant difference in hemoglobin levels

before and after the intervention. In other words, giving treatment to the family empowerment model has a significant effect on hemoglobin levels in pregnant women.

Discussion

The result indicated that the family empowerment model in carrying out early detection of high-risk pregnancies can be done by providing education, assistance, and training to families. This is in accordance with previous research, namely efforts to increase knowledge and skills through education and training can lead to sustainable behavior change.[12] The intervention of the family empowerment model positively impacts the family, because it can increase family satisfaction and empowerment.[13]

The family empowerment intervention given to the treatment group was carried out in a structured manner by providing material that was compiled based on the research results and modeling in phase 1 research. The family empowerment intervention was carried out with home visits conducted in 8 sessions for 8 weeks (done regularly once a week) with a duration of ±60-120 minutes through home visits. The method used is lectures, discussions (questions and answers) are carried out in the first and second weeks, at additional meetings and demonstrations, and counseling are contextual and adult learning with an active learning process using interactive learning media, through booklet media, learning modules, KSPR scores, the DRISK application that can be downloaded via the Play Store, as well as the use of MCH books. At the end of each meeting, the researcher asked the respondents again about the material that had been presented.

Empowerment carried out for families through strengthening filial values by strengthening internal factors (knowledge, self-motivation, and family connectedness) and external factors (midwives, and support) makes families able to commit to caring for pregnant women,[14] pass the empowerment stages well and able to collaborate with health workers in efforts to care for pregnant women which in turn can improve the ability of families in early detection of high-

risk pregnancies.[15] Empowerment interventions for families can increase knowledge, motivation, self-confidence which can increase knowledge and technical skills, as well as the ability to perform early detection of high-risk pregnancies.[13,16]

The results of the statistical test analysis of the intervention group on hemoglobin levels resulted in a significance value of <alpha (5% or 0.05). Therefore, it can be stated that there is a significant difference in the hemoglobin levels of pregnant women before and after the intervention. Family involvement in educational interventions regarding the recognition of pregnancy danger signs and early detection of high-risk pregnancies can increase the family's ability to help detect worsening of pregnant women,[17] predict morbidity in at-risk pregnant women and allow timely intervention to prevent the possibility of more severe conditions. The family, in this case the closest people to pregnant women, plays an important role in prenatal care, including in early detection of high-risk pregnancies.[18,19]

Family involvement in the introduction of high-risk family factors is important to support success in determining how families integrate, interpret, and adapt to high-risk pregnancies.[17] The role of the family in the introduction of risk factors for pregnancy is in the form of ways to recognize the signs of a risky pregnancy, as well as knowing when is the right time to bring pregnant women for intensive examinations so that there is no emergency according to the advice of health workers.[19] Independence to carry out early detection of risky pregnancies can be increased by providing education and optimizing MCH books that are carried out intensively.[20]

The results showed that in general the hemoglobin levels of pregnant women in the treatment group experienced an increase in the average Hemoglobin value, while the control group experienced a decrease. Furthermore, it is known that the distribution of the Hemoglobin status of pregnant women in the treatment group has increased under normal conditions (80%) previously (66.7%). Then the control group is known to remain in normal conditions as much

as 60% both pre and post. This shows that the anemia status of the treatment group has normal conditions or leads to a better condition than the control group. It is also proven, especially in pregnant women who have an abnormal Body Mass Index, there is a significant difference in the value of the hemoglobin indicator. The results of statistical test analysis on the Hemoglobin indicator obtained a significance value of <alpha (5% or 0.05). Therefore, it can be stated that there is a significant difference in the Hemoglobin indicator. In other words, there is a significant effect of giving treatment to the family empowerment model (family empowerment) on the hemoglobin of pregnant women.

Hemoglobin is a parameter that is widely used to determine the prevalence of anemia.[21] Anemia is a medical condition in which the number of red blood cells or hemoglobin is less than normal. Pregnant women are said to be anemic if the hemoglobin level is <11 g/dL. Most women experience anemia during pregnancy, both in developed and developing countries. The World Health Organization (WHO) estimates that 35-75% of pregnant women in developing countries and 18% of pregnant women in developed countries are anemic.[22]

Hemoglobin that is less than the normal limit or anemia often occurs due to iron deficiency, because in pregnant women there is a twofold increase in iron requirements due to an increase in blood volume without expansion of plasma volume, to meet the needs of the mother (prevent blood loss during childbirth) and growth fetus. Ironically, it is estimated that under 50% of mothers do not have sufficient iron stores during pregnancy, so the risk of iron deficiency or anemia increases with pregnancy.[23] There is a close correlation between anemia during pregnancy and fetal death, abortion, congenital defects, low birth weight, reduced iron stores in children or children born with anemia. This condition causes the perinatal mortality rate is still high, as well as maternal mortality and morbidity. In addition, it can cause bleeding during delivery which is the main cause of death for pregnant/maternal women.[24]

The causes of anemia during pregnancy in developing countries are influenced by various factors including micronutrient deficiencies of iron, folate, vitamins A and B12, parasitic infections such as malaria and intestinal worms or chronic infections such as Tuberculosis (TB) and Human Immunodeficiency Virus (HIV).[25] The contribution of each factor that causes anemia during pregnancy will vary depending on geographic location and diet. Anemia during pregnancy will have a negative impact on the health of pregnant women and fetuses.[26] The disorders experienced by pregnant women are related to the problem of anemia during pregnancy. Anemia during pregnancy has an impact on pregnancy, childbirth and the puerperium, namely miscarriage, premature labor, uterine inertia, prolonged labor, uterine atony, shock, afibrinogenemia, intrapartum and postpartum infections, and heart failure.[27] Anemia experienced by pregnant women will also have a negative impact on the baby, namely the risk of preterm, low birth weight and an increased risk of perinatal death.[28]

Educational interventions can increase family support for maternal behavior in preventing pregnancy anemia such as increasing adherence to taking iron supplements and high intake of foods containing iron.[29] Through the education provided, there is an increase in family knowledge and insight to try to improve the condition of pregnant women in normal conditions, one of which is by providing knowledge regarding the benefits and impacts of taking iron tablets regularly, how to take them, absorption of iron will be inhibited and absorbed perfectly when together with consuming certain drinks, as well as what foods and drinks can be consumed by pregnant women to increase hemoglobin levels.[30,31]

Conclusions

The family empowerment model can improve the health status of pregnant women, especially on hemoglobin levels. After being given the intervention of the family empowerment model, there was an increase in family participation in early detection of high-risk pregnancies so as

to prevent pregnancy complications. Given that the family empowerment model leads to improved health status, particularly in terms of hemoglobin levels among pregnant women, it suggests that involving families in healthcare decisions can have significant positive outcomes. Therefore, healthcare providers and policymakers should consider implementing family-centered interventions to enhance family participation in early detection of high-risk pregnancies. This proactive approach can help prevent pregnancy complications and improve maternal and fetal health outcomes.

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Table 1. Distribution of respondent characteristics (N=60).

Characteristics	Category	Control		Intervention		p-value
		n	%	n	%	
Husband's age	17-25 years old	12	40.0	9	30.0	0.589
	26-45 years old	18	60.0	21	70.0	
Husband's education	Base	8	26.7	4	13.3	0.420
	Intermediate	18	60.0	22	73.3	
	High	4	13.3	4	13.3	
Husband's job	Factory workers	0	0.0	1	3.3	0.100
	Drivers	0	0.0	2	6.7	
	Trader	12	40.0	9	30.0	
	Nurse	0	0.0	1	3.3	
	Security guard	0	0.0	3	10.0	
	Government employees	1	3.3	0	0.0	
	Private	16	53.3	11	36.7	
	Self-employed	0	0.0	3	10.0	
	Doesn't work	1	3.3	0	0	
Pregnant women's age	17-25 years old	16	53.3	17	56.7	1.000
	26-45 years old	14	46.7	13	43.3	

Pregnant women's education	Base	8	26.7	6	20.0	0.621
	Intermediate	20	66.7	20	66.7	
	High	2	6.7	4	13.3	
Pregnant women's job	Teacher	0	0.0	1	3.3	0.181
	Trader	3	10.0	3	10.0	
	Nurse	0	0.0	1	3.3	
	Private	4	13.3	11	36.7	
	Doesn't work	22	73.3	13	43.3	
	Self-employed	1	3.3	1	3.3	
Parity	First	15	50.0	17	56.7	0.951
	Second	10	33.3	8	26.7	
	Third	4	13.3	4	13.3	
	Fourth and more	1	3.3	1	3.3	

Table 2. Distribution of hemoglobin levels in the treatment group and the control group.

Category	Variables	Intervention (N=30)				Control (N=30)			
		Pre-test		Post-test		Pre-test		Post-test	
		n	%	n	%	n	%	n	%
Hemoglobin levels	Mild anemia	8	26.7	6	20.0	11	36.7	11	36.7
	Moderate anemia	2	6.7	0	0.0	1	3.3	1	3.3
	No anemia	20	66.7	24	80.0	18	60.0	18	60.0

Table 3. Testing results of pregnant women's hemoglobin levels in family empowerment development research.

Indicator	Group	Test	$\bar{x}$	SD	Δ	Statistics	p-value
Hemoglobin levels	Intervention	Pretest	11.36	1.29	0.4767	-4.544	0.000
		Posttest	11.84	0.92			
	Control	Pretest	11.33	0.89	-0.1533	-3.555	0.000
		Posttest	11.18	0.92			

SD, Standard Deviation