

Android-based Health Promotion Influences Pregnant Women's Motivation in Consuming Iron Tablets in Bantul Indonesia

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Abstract Maternal mortality is a global public health challenge. Maternal and child health is one of the problems that requires attention in Indonesia. This is because the maternal mortality rate in Indonesia is still high and has not yet reached the expected target in the Sustainable Development Goals (SDGs), namely below 70 per 100,000 live births in 2030. Providing education will bring change and increase knowledge in society in a short time so that pregnant women are expected to behave according to health values. The research aimed to determine the effect of Android-based health promotion on the motivation of pregnant women to consume iron tablets. The research method uses an experimental design. The research subjects were pregnant women in Bantul Regency with a research sample of 42 respondents using purposive sampling as the sampling technique. Data collection uses a questionnaire whose validity has been tested. Statistical tests use nonparametric tests because the data are not normally distributed, specifically the Mann-Whitney test. The research results showed that the characteristics of the respondents were mostly of healthy reproductive age, with secondary education and not working in both the intervention and control groups. Based on the Wilcoxon statistical test, the motivation of respondents in the control group showed a significant difference (<0.05) before and after being given health education. The P value was 0.013,

while for the control group it was 0.032. Meanwhile, the Mann-Whitney test shows a p value of 0.033 (< 0.05). In conclusion, there is an influence of Android-based health promotion on the motivation of pregnant women to consume iron tablets. Every health service is expected to provide health promotion to increase motivation to take iron tablets.

Keywords Health Promotion, Iron Tablets, Motivation, Compliance, Anemia in Pregnancy

1. Introduction

The high maternal mortality rate in Indonesia is still a health problem in health services, one of which is caused by pregnancy anemia. Anemia causes global public health problems in both developed and developing countries. The most vulnerable group is pregnant women [1]. The maternal and infant mortality rate in Indonesia is directly caused by various factors, including bleeding, preeclampsia, and infection. Nutritional problems are an indirect cause, including anemia, namely 40% [2,3]. The prevalence in developed countries is 14%, while in developing countries it is 51% [4]. The frequency of

pregnant women experiencing anemia in Indonesia increased from 37.1% in 2013 to 48.9% in 2018. Anemia is a risk factor for intrauterine growth retardation, affecting poor neonatal health and perinatal mortality [4]. Anemia in pregnancy has a negative impact on pregnancy, childbirth, and the postpartum period. Anemia in pregnancy can cause bleeding, infection, and prematurity. Anemia in pregnancy is also often associated with stunted uterine growth, premature birth, low birth weight, perinatal death, and maternal death [5,6]. Pregnancy anemia also has a negative impact, causing various health risks throughout the world [7]. Anemia in pregnant women is mostly caused by iron deficiency, which is often called iron deficiency anemia [6,8]. Anemia caused by iron deficiency affects 25% to >50% of pregnant women worldwide [6,8,9].

Efforts to overcome the problem of pregnancy anemia include consuming foods high in vitamins and minerals that contain iron. However, this is not enough to meet iron needs during pregnancy, so it is necessary to add iron supplements to both treat and prevent pregnancy anemia. Research by Caniglia et al [10], explains that giving multi-micronutrient supplementation (MMS), including iron, folic acid, and other micronutrients, is more effective in preventing the risk of premature birth, low birth weight, and very low birth weight compared to just giving folic acid. Providing iron tablets to pregnant women has been given by health workers as a routine government program, but this is not balanced by motivation and compliance with taking iron tablets by pregnant women. Currently, there are still many pregnant women who do not comply with consuming iron tablets during pregnancy as recommended by the government program. Pregnant women are said to be compliant if they consume more than 90% of the iron tablets that should be consumed as recommended, namely more than 90 iron tablets [11,12]. This is caused by factors such as low knowledge, forgetting, and fear of side effects [13–15].

Efforts to increase the motivation and compliance of pregnant women consuming iron tablets are made by providing health promotion through counseling. Providing counseling influences the motivation and compliance of pregnant women, who show high motivation after being given health education about pregnancy anemia [14]. Providing Android-based health promotion is an option because most pregnant women use smartphone to access health information, and smartphone applications provide attractive features according to the needs of pregnant women [16]. The research aimed to determine the effect of Android-based health promotion on the motivation of pregnant women to consume iron tablets.

2. Materials and Methods

The research method used an experimental design with a pretest-posttest control group design. The research subjects were pregnant women in Bantul Regency, with a research

sample of 42 respondents, which was divided into 2 groups. There were 22 respondents in the intervention group and 20 respondents in the control group. The researchers provided education using an Android-based application module that had been developed. The module, in the form of an Android application, had previously been tested for validity. The module explained pregnancy anemia, including the definition, symptoms, causes, impact of anemia, iron, iron needs, how to consume it, side effects, and how to manage it.

The sampling technique used was purposive sampling. The respondents in the study were those who met the inclusion criteria, were willing to take part in the study by signing informed consent, were pregnant women in the research area, were pregnant women in the 1st and 2nd trimesters who had received iron tablets for at least 2 weeks, and had an Android smartphone. Data collection used a questionnaire that had been tested for validity, including data on the characteristics and motivation of pregnant women. The motivation questionnaire used a Likert scale consisting of 5 ratings, including strongly agree, agree, doubt, disagree, and strongly disagree. The motivation questionnaire included aspects of attention, conformity, self-confidence, and satisfaction. The motivation questionnaire consisted of 28 statements. Pretest data collection was carried out when respondents first met via Google Form. Next, education was carried out using the application module, and after 2-3 weeks, the respondents were followed up to fill out the posttest via Google Form. Posttest data collection was carried out to determine respondents' motivation after being given education about anemia through the application module. Statistical tests used nonparametric tests, namely the Wilcoxon test and the Mann-Whitney test. This research has received ethical permission from the Alma Ata University Ethical Commission with No: KE/AA/VIII/989/EC/2019 Informed Consent. The research was approved by all respondents.

3. Results

It can be seen in Table 1 that the majority of respondents who participated were of healthy reproductive age, namely between 20 and 35 years, both in the intervention group, 19 (86.4%) and in the control group, 19 (95.0%). The majority of respondents' education was secondary education with a distribution of 14 people (63.6%) in the intervention group and 11 people (55.0%) in the control group. Meanwhile, in terms of employment, the majority of respondents did not work in the intervention group, 13 people (59.1%), and 10 people (50.0%) in the control group.

It can be seen in Table 2 that the mean value in the intervention group was 77.95 (pre-test) and 81.68 (post-test), showing an increase of 3.73. Meanwhile, the control group's mean value was 79.95 (pre-test) and 77.38 (post-test), experiencing a decrease of 2.57. The p-value of the

Wilcoxon test on the motivation of control group respondents was significant (<0.05) before and after being given health education, with a value of 0.013, while the control group had a value of 0.032. There was a significant

difference between the motivation of pregnant women in the intervention group and the control group with a p value of 0.033 (<0.05) in Table 3.

Table 1. Distribution of respondent characteristics

No	Characteristics	Experimental Group		Control Group	
		N	%	N	%
1.	Age				
	<20 Years	0	0	0	0
	20 – 35 Years	19	86.4	19	95
	> 35 Years	3	13.6	1	5
2.	Education				
	Basic	3	13.6	3	15
	Secondary	14	63.6	11	55
	Higher	5	22.7	6	30
3.	Work				
	Not Work	13	59.1	10	50
	Work	9	40.9	10	50

Table 2. Motivation of respondents based on the Wilcoxon test

Variable	Group		P value	Group		p value
	Pre-test	Post-test		Pre-test	Post-test	
Motivation			0.013			0.032
Mean	77.95	81.68		79.95	77.38	
Standard deviation	5,028	6,136		4,110	3,442	
Minimum	69	75		75	90	
Maximum	91	100		69	83	

Table 3. Motivation of respondents based on the Mann Whiney test

Mann-Whitney U	136,000
Wilcoxon W	346,000
Z	-2.130
Asymp . Sig. (2-tailed)	0.033

4. Discussion

Most of the respondents in this study were in the age range of 20–35 years, which shows that respondents of reproductive age were healthy or not at risk. Age influences a person's knowledge of how to absorb information. Knowledge is what someone knows about something. Behavior that is based on knowledge will last longer than behavior that is not based on knowledge. If pregnant women have good knowledge about the impacts, risks, complications of pregnancy, and benefits of iron tablets, then they will try to avoid anemia during pregnancy by consuming iron tablets [12,17,18]. Most pregnant women now use Android smartphone to access information, especially related to their pregnancy. The older a person becomes, the more a person's knowledge will increase, because the more mature a person is, the easier it will be to understand and absorb the information obtained. Knowledge is also influenced by a person's level of education and employment status. The more highly educated, the higher a person's knowledge tends to be. This is because a person's high level of education will increase their insight and ease of accessing various media to find information related to what pregnant women need [19–21]. In this study, the majority of pregnant women had secondary education. In line with [21], the majority of respondents will be 56.7% non-risk, with 80.0% having secondary education and 75.0% not working. Knowledge has an influence on changes in the behavior of pregnant women in carrying out various activities they want to do, including personal attitudes, namely motivation for consuming iron tablets [22].

Regular administration of iron tablets can prevent anemia during pregnancy. This is caused by a lack of iron intake during pregnancy, which will have a negative impact on pregnancy, childbirth, and postpartum. In line with research by Wendt et al [23], it is explained that pregnant women whose hemoglobin levels are high are caused by the pregnant woman's compliance with consuming iron tablets regularly. It is recommended that consuming fewer iron tablets will cause a decrease in hemoglobin levels in pregnant women, causing pregnancy anemia. Efforts that must be made to increase motivation and compliance with consuming iron tablets include providing counseling or health education about pregnancy anemia. It is hoped that pregnant women will experience changes in knowledge, attitudes, and behavior for the better. Nivedita & Shanthini [24] research in 2016 explains that the majority of pregnant women have not received counseling about pregnancy anemia by 70% and have experienced anemia by 62%. Therefore, it is crucial to provide health promotion regarding pregnancy anemia in health services. This effort aims to increase the motivation and compliance of pregnant women in consuming iron tablets to prevent pregnancy anemia. Similarly, Verney et al [25], explained that providing health education influences compliance with taking iron tablets. Motivation and adherence to taking iron

tablets will increase after being given counseling.

One of the causes of anemia in pregnancy is a lack of motivation and non-compliance with pregnant women taking iron tablets regularly. Non-compliance with consuming iron tablets is caused by side effects such as constipation, nausea, and stomach aches, so education is needed about the benefits of iron tablets, the need for iron, how to take tablets, and how to deal with the side effects of iron tablets [26]. Other research states that pregnant women's non-compliance with consuming iron tablets is caused by fear or worry that it will harm their baby, the baby will be big, and a lack of awareness of the benefits of iron tablets, forgetfulness, and side effects are the highest causes of non-compliance [27,28]. Pregnant women's compliance is positively related to their level of education, nutrition education, health worker education, and high coverage of antenatal care visits [29]. Other research explains that the factors that influence the consumption of iron tablets during pregnancy, namely maternal age, education, wealth index, birth order, ethnicity, husband's presence at antenatal visits, exposure to mass media, and religion, have a significant relationship to iron tablet consumption [30].

The study explains that various efforts to overcome the failure of pregnant women to comply with the consumption of iron tablets include health education carried out both at the individual and community levels. Health education encompasses information on pregnancy-related anemia, including its causes and effects, nutritional guidance, sources of iron-rich foods, the importance of iron supplementation as prescribed, proper prenatal care, and ensuring compliance with regular iron tablets [31]. Likewise, if pregnant women consume food with balanced nutrition and are able to prevent infection during pregnancy, they will avoid congenital abnormalities after the baby is born, such as damage to the neural tube and skull in newborn babies [32].

Providing Android-based education can increase the motivation of pregnant women because the module is equipped with more attractive image and color features, and the module can be read at any time because it is more practical to store in a cell phone application. Most pregnant women search for health information using their cell phones compared to reading books because it is easier and more complete to find information using a cellphone. The Android application module developed by researchers is equipped with a reminder to drink iron tablets. So that pregnant women can take iron tablets according to the specified time. Reminder applications can increase the motivation and compliance of pregnant women with consuming iron tablets.

In line with [33], it has been explained that education using Android-based application modules can improve the knowledge, attitudes, and behavior of pregnant women. Respondents' knowledge increased because the Android-based application module was equipped with complete and comprehensive material about pregnant women's nutrition,

tailored to their needs. As a result, respondents' interest in studying the module increased. Using Android-based applications can also increase respondents' knowledge because it is easier to reach pregnant women wherever they are [34]. Other research explains the need to pay attention to the needs of respondents, especially those who have low education, low socio-economic status, and live in remote areas far from internet networks, because they will have difficulty accessing and using smartphones with Android technology [35,36].

Using Android-based applications as a medium for health education is more effective because this medium is more flexible and has fast and easy processing power. The impact of using Android-based educational media is that it is easily accessible to anyone and anywhere and can overcome various obstacles in providing health education, especially for pregnant women who have difficulty accessing health information, so training is needed in its use. Android-based educational media are equipped with smartphones [37].

Android smartphone-based pregnant women's health applications are the right choice for finding health information during pregnancy. This application is more effective in health services, according to WHO recommendations. Because what pregnant women need now is information that is fast, easy, and can be read again if they need health information. Health education through applications is more effective than health education through print media [38].

5. Conclusions

Android-based health promotion influences pregnant women's motivation to consume iron tablets in Bantul Regency, Indonesia. Experienced increased motivation to comply with taking iron tablets after being given Android-based education. Recommendation: Pregnant women should place more emphasis on providing education about pregnancy anemia and its dangers, the importance of consuming iron tablets during pregnancy, and the need for iron, according to recommendations, as well as regular monitoring of compliance with taking iron tablets.

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