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Pharmacist Counselling Can Change Adherence to Iron Supplementation and Physical Activity Lifestyle of Anaemic Pregnant Women in Yogyakarta

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ABSTRACT

Pharmacists have a role in reducing maternal mortality in 2030 to less than 70 per 100.000 live births. One of the causes of maternal mortality is anemia in pregnancy. The study objective was to assess the determinant factor and effect of solution-focused brief counseling (SFBC) by pharmacists to decrease the prevalence of anemia in pregnancy and improve the adherence to taking iron supplements and physical activity. We conducted a multicenter prospective quasi-experimental study of pregnant women in the urban, middle, and rural areas in Yogyakarta from February-October 2019. A total of 225 respondents participated in this study, divided into control and intervention groups within 30 following days. The results of the study show incidence of anemia are common in a rural and urban area with an incidence of 58.30% and 40.40%. Based on multivariate analysis, managing the consumption of oral iron supplements (OR=2.819, p=0.011) and dietary habits (OR=2.549, p=0.015) were determinant factors for anemia. The SFBC method significantly improved iron supplements adherence and physical activity during pregnancy compared to the control group in the overall area (p<0.010). The prevalence of anemia in pregnancy can be prevented by changing health behavior through the SFBC method, which is supported by synergistic collaboration between health workers.

Keywords: *Solution–focused brief counselling, pharmacist; pregnancy, iron supplement, health behavior, haemoglobin*

1. INTRODUCTION

Anemia during pregnancy is associated with low birth weight, intrauterine growth restriction (IUGR), a higher postpartum hemorrhage rate, especially in the third trimester [1][2][3], and premature birth [4]. Anemia during pregnancy occurs due to nutritional deficiencies, inadequate intake of iron consumption, and an unhealthy lifestyle [5][6]. Anemia contributes to the causes of maternal mortality [7][8]. Anemia has become a global health problem, which requires the role of health workers to provide information and appropriate treatment. It is not only the role of the government, but self-awareness of pregnant women and family motivation are determinants in reducing the morbidity and mortality of anemic pregnant women [9][10].

Support to reduce the incidence of anemia in pregnancy from a health care program given with routine checks for hemoglobin and health examination at least every trimester of pregnancy. Anemia in pregnancy can be known by hemoglobin value. Measurement of hemoglobin and hematocrit is the primary screening for anemia accompanied by symptoms of anemia (such as dizziness, blurred vision, weakness, until tachycardia occurs when severe anemia occurs (pulse >100 times per/minute) [11]—reducing red blood cells during pregnancy due to the hemodilution process. Hemodilution occurs when the expansion of plasma volume (plasma fluid) is not proportional to the addition of red blood cell mass [12]. Plasma volume enhances, especially in the second trimester, where the fetal organ growth process occurs until the last eight weeks [13][14]. Hemoglobin will decrease when iron storage is not replaced in the spleen and ribs. A decrease in hemoglobin manifests a

decreased storage of iron, and these conditions cause iron deficiency anemia [15][16]. Anemia during pregnancy can be categorized based on gestational age if hemoglobin level of 110.0 g/L with hematocrit due of 33% in early pregnancy 0-12 weeks of pregnancy. Anemia in the second trimester occurs when hemoglobin level of 105.0 g/L with a hematocrit value of 31% (gestational age 13 -28 weeks), while at 29 weeks in the third trimester, a woman can be anemic when hemoglobin level of 110 g/L with a hematocrit value of 33% [11][17].

In addition to the hemodilution process, the low intake of iron supplements and macronutrients are anemia-inducing factors during pregnancy. Iron stored in the body will be necessary for the prevention of anemia in pregnancy [18]. Side effects of iron supplements, especially ferrous sulfate and fumarates such as nausea, vomiting, metallic taste in the mouth, and constipation, are the reasons for non-adherence to iron-folic acid supplementation [19][20]. Another contributing factor to anemia is physical activity during pregnancy [21].

The severity of anemia in the third trimester can affect the baby's weight at birth [22][23]. The incidence of anemia in pregnant women globally has reached 32.4 million to date. One of the countries with a relatively high incidence of anemia is Indonesia, in which the incidence of anemia in pregnant women increased from 2013-2018 by 37.1% to 48.9% [24]. One of these increases occurred in the Special Region of Yogyakarta. Anemia during pregnancy increased in 2018 to 15,21%, the most in Yogyakarta (35.49%) and Bantul (15.18%). Therefore, the two areas used in this study cover urban to rural areas. Efforts to decrease the prevalence require the collaboration of health workers, which is the role of pharmacy in educating pharmacological and non-pharmacological information and monitoring the goal of therapy for pregnant women with anemia.

This research was attended to determine the effect of solution-focused brief counseling by the pharmacist on behavior during pregnancy, including dietary, adherence to consume iron supplementation, and lifestyle. Pharmacists can apply solution-focused brief counseling for solving pharmacological and non-pharmacological therapy problems that cause anemia in pregnancy [25]. This method will encourage respondents to changes and apply positive behavior during pregnancy [26] [27].

Pharmacists will approach pregnant women with practical and goal-oriented solutions to health problems. The counselor will advise and repeat the success ever achieved by patients or evidence-based cases around them in overcoming anemia during pregnancy. That way, the patients will feel more at ease than learning new solutions to achieve their goals [28][29]. Therefore, we are interested in knowing the effectiveness of pharmacy education through a practical and collaborative approach to pregnant women in urban areas and can be comprehensive to rural areas using the solution-based counseling method. This method is combined with the application of trans-theoretical models (pre-contemplation, contemplation, preparation, action, and maintenance) for pregnant women in Yogyakarta. The stages of a person's behavior change can occur linearly, or non-linearly depending on each individual to experience development or retreat to the previous stage.

2. METHODS

2.1. Study Setting

Primary health centers in several regions of Indonesia provide antenatal services through maternal and child health programs (MCH). Integrated antenatal care (ANC) and reasonable costs are the reason many pregnant women visit the primary health center. This research was conducted in Yogyakarta and Bantul from February until October 2019, covering urban, middle, and rural areas. The primary health centers used include Jetis primary health center, Banguntapan III primary health center located in Banguntapan, Bantul, and Sewon II primary health center. Sewon II primary health center is located at Parangtritis Street, Bantul.

2.2. Study Design

A multicenter prospective quasi-experimental study with pre-test and post-test control group design was applied in this research. Data were collected prospectively for 30 days, on days 1 (pre-test) and 31 (post-test). Respondents in this study were divided into control and treatment groups in each primary health center with convenience sampling techniques. The treatment group got SFBC by the pharmacist with a 5A strategy (assess, advise, agree, assist and arrange). Both groups were measured for hemoglobin, stage of health behavior, physical activity, and dietary intake through the food frequency questionnaire (FFQ) combination with food records to determine food consumption and calories patterns and their adherence to consume iron supplementation.

The pre-test and post-test range from 30 days refer to the therapeutic response of iron supplementation. The therapeutic response of iron supplementation to hemoglobin can be obtained after 3-4 weeks with an increased target of 10-20 g/L [30][31][32]. In addition, the effectiveness of communicators in conveying messages aimed at changing attitudes can be measured immediately after delivering the message 10-14 days thereafter [33]. At the peak time, the patient will make changes in behavior and apply the information received five days thereafter and decreases significantly within 30 days

[34]. The procedure of this research is presented in Figure S1.

2.3. Eligibility Criteria and Sample Size

Pregnant women who were eligible in this study are those in the first trimester (lasts from week 1 through the end of week 13 of pregnancy), the second trimester (13 to 27 weeks), and the third trimester (28 to 32 weeks). The respondent had to follow prenatal care since early pregnancy in primary health centers. Pregnant women who were willing to be respondents take part in this research by carrying out hemoglobin examination conducted on pre-test (day 1) and post-test visit (day 31), completing the pre-test and post-test questionnaire, and following the discussion with the solution-focused brief counseling method by pharmacists (for the treatment group). The respondent would be excluded if she had preterm labor and was referred to the hospital due to a worsening condition of her pregnancy (Figure S1).

The non-probability sampling technique with consecutive sampling was used. The sample size was calculate based on the prevalence of maternal anemia in 2018 to 15.21% in the Special Region of Yogyakarta. Kelsey formula is used to calculate sample size based on the percent of exposed with anemia (15.21%), two-side significance level (90%), power estimate (80%), and odd ratio (3.4). Obtained sample size for an exposed group (intervention) and non-exposed group (control) for each group of 108 (n=216). respondent. To anticipate dropout patients, the sample size increases by 15% so the number of samples that can be used in this study is 216-255 respondents. Until the end of the study, the number of samples was 225 respondents.

2.4. Data Collection

Primary and secondary were are used in this study. Secondary data were obtained from recording medical records to determine the complete identity of the patient, the patient's medical history, the history of the last child's birth, and the results of hemoglobin tests. Primary data were obtained directly from interviews with respondents. It was intended to know the stages of behavior during pregnancy, including eating patterns, physical activity questionnaire (Indonesian version of IPAQ) [35], dietary behavior through the food frequency questionnaire (FFQ) [36], and adherence questionnaire (the result of reliability test α=0.782) (Sup.1) [30].

The stages of behavior during pregnancy were determined through seventeen open-ended questions that include the knowledge domain related to anemia in pregnancy (5 items), the treatment domain (6 items), and the general health domain during pregnancy (6 items). At this stage, the respondent had the freedom to answer according to the current condition. Still, the counselor directed the respondent's answer following the intent and purpose of the question. The purpose of the method was to explore information related to understanding, problems with the use of drugs or pregnancy supplements, and motivation to make behavioral changes. The changes could be seen from the respondent's enthusiasm in answering each open-ended question. The answers to each question item were categorized in the stages of pre-contemplation, contemplation, preparation, action, and maintenance (Sup 2).

2.5. Ethics Approval and Informed Consent

This study has obtained ethical clearance from the Research Ethics Commission Dr. Moewardi Faculty of Medicine, Sebelas Maret University Surakarta with registration number 775/VI/HREC/2019. Ethical clearance is determined in accordance with the Helsinki declaration on ethical principles for medical research involving human subjects and the national guidelines for the ethics of health research. Before participating in the research, respondents were asked for their approval through written informed consent that contains an explanation of the purpose and procedures of the research orally and written, a statement to follow the research, the signatures of respondents, witnesses, and the researcher. At this stage, the respondent has the right to refuse to participate without any consequences.

2.6. Statistical Analyses

The proportion of social-demographic characteristics and health status of respondents of the treatment and control groups at each primary health centre used the Pearson Chi-square test for 2x2 tables ($p<0.050$). Qualitative data in this study were multivariate analysed using a binary logistic regression model. It was to determine the effect of socio-demographic factors, health status, dietary habits, and the use of iron supplements during pregnancy which were most dominant on the incidence of anaemia, physical activity, and stage of health behavior in pregnant women. The comparative analysis of paired numerical data (pre-test and post-test) uses t-test. The result of this study has a significant correlation and effect if $p<0.050$ with an odds ratio (OR) value at the 95% confidence level (Cl).

3. RESULTS AND DISCUSSION

The characteristics of respondents in this study, including socio-demographic and pregnant women's health status, are presented in Table 1. The results of bivariate analysis on socio-demographic variables show that there are no statistically significant differences in proportions between control and treatment groups

domiciled variables (p=0.970), the education level (p=0.059), and employment status (p=0.586). The Chi-square test results show a difference in the proportion between the risky and safe ages to start pregnancy in each group with a p-value of less than 0.050 (p=0.007). Most respondents in the control and intervention groups were in their 20s and early 30s, with each percentage in the control and treatment groups 97.3% and 87.7%.

The health characteristics of the respondents in this study were also known through the open-ended question. It needs to be known because the condition of pregnant women will affect the health of both mother and baby during pregnancy[35][36][37]. Maternal health during pregnancy can impact the fetus, one of which is anemia. Anemia that occurs in pregnant women is influenced by several factors (Table 2). It can be seen that hemoglobin during pregnancy can be influenced by iron supplement intake and the type of food consumed, with a linear relationship [38]. If pregnant women consume iron and eat a healthy diet, they can reduce the risk of anemia [37]**.**

Table 1. Demographic characteristics and *Health status* of pregnant women at public health center

Variable	Characteristics of Respondent	Frequency of Group, n (%)		P-value
		Control, n=111	Intervention, n=114	
Socio-demographic	**Domiciled**			
	Rural area	36 (32.4%)	36 (31.6%)	0.970[b]
	Middle area	28 (25.2%)	31 (27.2%)	
	Urban area	47 (42.3%)	47 (41.2%)	
	Age of getting pregnant			
	Risky pregnancy (less than 20s)	3 (2.7%)	14 (12.3%)	0.007*[a]
	Not at risk (20s or early 30s)	108 (97.3%)	100 (87.7%)	
	Education level			
	Elementary-Junior high school	13 (11.7%)	24 (21.1%)	0.059[a]
	Senior high school- University	98 (88.3%)	90 (78.9%)	
	Employment status			
	Worker	38 (34.2%)	43 (37.7%)	0.586[a]
	Housewife	73 (65.8%)	71 (62.3%)	
Maternal health	**Stages of Pregnancy**			
	1st trimester (1 to 12 week)	5 (5.4%)	7 (6.1%)	0.808[b]
	2nd trimester (13 to 26 week)	46 (41.4%)	44 (38.6%)	
	3rd trimester (27 week and greater)	59 (53.2%)	63 (55.3%)	
	Gravida			
	Primigravida	43 (38.7%)	46 (40.4%)	0.823[b]
	Multigravida	44 (39.6%)	38 (33.3%)	
	Grande multipara	24 (21.6%)	30 (26.3%)	
	History* of *miscarriage			
	Yes	7 (6.3%)	14 (12.3%)	0.124[a]
	No	104 (93.7%)	100 (87.7%)	
	History of Disease			
	Yes	33 (29.7%)	45 (39.5%)	0.125[a]
	No	78 (70.3%)	69 (60.5%)	
	BMI			
	Underweight (less than 18.5)	15 (13.5%)	8 (7.0%)	0.061[b]
	Healthy weight (18.5-24.9)	63 (56.8%)	63 (55.3%)	
	Overweight (25-29.9)	26 (23.4%)	28 (24.6%)	
	Obese (30 and greater)	7 (6.3%)	15 (13.2%)	
	MUAC			
	Risky CED (less than 23.5cm)	15 (13.5%)	15 (13.2%)	0.937[a]
	No risk of CED (23.5cm and greater)	96 (86.5%)	99 (86.8%)	

Notes: [A] Chi- square test, [b] Mann-Whitney test, *Significant proportion differences between groups. **Abbreviations:** BMI, *Body Mass Index;* MUAC, Mid-Upper Arm Circumference; *CED, Chronic Energy* Deficiency

The results of the multivariate analysis (Table 2) show that the work has a linear relationship with the level of physical activity undertaken. Being not adherent to consume iron supplements is caused by their hectic daily activity. Many women neglect their health during pregnancy and become factors that increase anemia [30]. This habit can affect the readiness of pregnant women to the implementation healthy behavior during pregnancy. In addition, it can influence the readiness to cope with pregnancy. This habit can affect the readiness of pregnant women to the implementation healthy behavior during pregnancy.

In addition, it can influence by a readiness to receive her pregnancy. Older maternal age will affect the preparation for the pregnancy for those over 20 years old. It will be easier to change behavior and awareness to implement a healthy lifestyle during pregnancy in these conditions. Based on the finding factors in Table 2, solution-focused brief counseling (SFBC) by the pharmacist was carried out in this study focusing on behavior change. The result of this study, solution-focused brief counseling by the pharmacist, can change the positive health behavior of the treatment groups in rural, middle, and urban areas. After monitoring for 30 days (post-test), the intervention group based on the stage of behavior models was mainly in the preparation stage (not consistently taking significant action in implementing a healthy lifestyle) 46.49%, increasing to 54.39% in the maintenance stage. This means that they were able to maintain their change in behavior for 30 days of observation. These results can be seen in Figure 1.

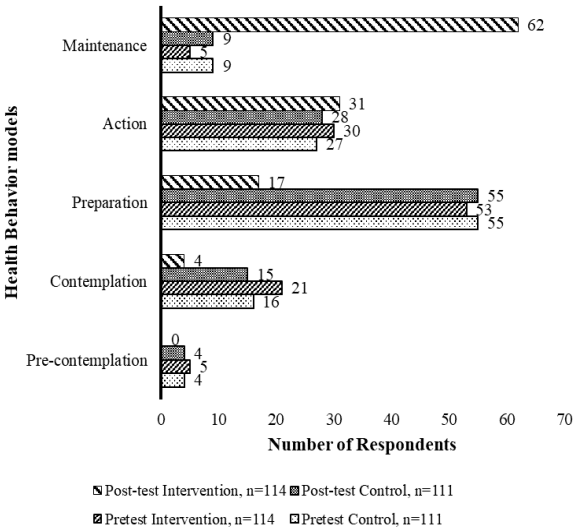

Figure 1 Health behavior during pregnancy

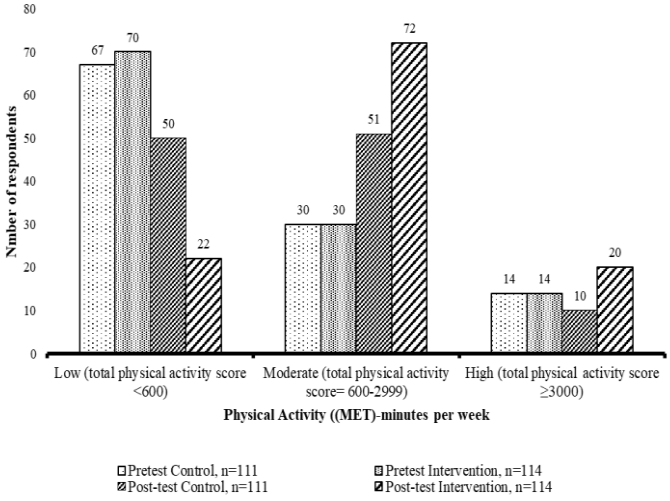

Figure 2 Physical activity during pregnancy

Table 2. Multivariate analyze of anemia, physical activity, and behavior during pregnancy

Variable	Factors	B	OR	95% CI		p-value
				Lower	Upper	
Hemoglobin	Iron supplement Type of food consumed	1.036 0.936	2.819 2.549	1.202 1.202	6.282 5.408	0.011* 0.015*
Physical activity	*Daily Work*	-0.781	2.065	1.066	4.000	0.022*
Stage of behavior	Age of getting pregnant	1.718	5.575	1.847	16.825	0.002*

Notes: B, Coefficient; OR, odd ratio with *95% confidence interval (CI), ** statistically significant test result ($p \leq 0.05$)

This behavior change was proven by the increasing level of adherence of pregnant women to consuming iron supplements. The results of the calculation of the iron pill count consumed for 30 days, showing significant results with the pre- test and control groups (Table 3). In addition, adherence to consume iron supplements and physical activity showed positive results. Most of the respondents are in the moderate stage (63.16%), with controlled activity levels. It is expected to increase awareness regarding the importance of maintaining healthy behavior during pregnancy (Figure 2, Table 3). The education from nutritionists at the primary health center with

confirmation from pharmacists improved dietary habits in the intervention group.

Unhealthy dietary consumption patterns of respondents (65.79%) were reduced to 29.82 (Figure S2), which confirmed statistically significant results from the FFQ score (Table 3). The success of problem-solving-based pharmacological counselling has a positive impact on reducing anemia cases in pregnant women. In Figure S3 and Figure S4, the decrease in the percentage of anemia post-test in the intervention group in rural, middle, and urban areas experiencing a decrease in anaemia by 38.8%, 12.9%, and 21.9%, respectively. If seen in each trimester of pregnancy (Table 1), it statistically shows a significant result at the 2nd and 3rd trimester of the increase in haemoglobin values.

The prevention and control of anemia in this research was carried out through solution-focused brief counseling by the pharmacist because taking iron supplements and dietary habits affects anemia during pregnancy with the odds ratio, respectively, OR=2.819 and OR=0.011 ($p<0.050$). SFBC method can change the stage of behavior, mainly in the preparation stage into the maintenance stage. This can be seen from the ability to change food consumption, adherence to consume iron supplements, and physical activity according to lifestyle recommendations during pregnancy, with the significant result of the **pre-test** and post-test in the intervention group compared to the control group ($p<0.050$).

Physiological changes happen during pregnancy due to the development of the fetus in the uterus and protecting the fetus from pathogenic infections, one of which is the Coronavirus disease 2019 (COVID-2019), which is currently a pandemic. These physiological changes cause haemodilution in the first trimester until its peak in the second trimester. Haemodilution occurs during pregnancy can cause anemia in the second trimester of pregnancy or during pregnancy due to a decrease in red blood and insufficient iron storage. Red blood cells will be overhauled with a cycle of 120 days in the spleen and ribs, with the main requirement in this process is iron. It will have implications for reducing hemoglobin that can increase the risk of anemia.

Table 3. Effect of solution-focused brief counselling on physical activity, dietary habit, adherence to consume iron supplementation, and haemoglobin during pregnancy

Variable dependent	Gain score ($\bar{X}$ ± SE) Pre-test and Post-test Score		P-value	Risk Ratio (RR)	95% CI	
	Control (n=111)	Intervention (n=114)			Lower	Upper
Physical activity						
Time (MET-min/week)	34.11 ± 11.60	155.97 ± 25.44	<0.001*[a]	1.367	1.052	1.775
Calory (Kcal/week)	49.79 ± 18.63	157.67 ± 29.23	<0.001*[a]			
FFQ	3.63 ± 4.33	51.26 ± 6.41	<0.001*[b]	2.417	1.840	3.174
Adherence						
Pill count (%)	8.57 ± 2.37	25.35 ± 2.22	<0.001*[b]	2.254	1.793	2.835
Adherence questionnaire (%)	9.64 ± 1.67	30.79 ± 1.83	<0.001*[b]	2.199	1.587	3.048
Hemoglobin (g/l)	-3.38 ± 1.24	7.22 ± 0.89	<0.001*[a]	3.346	2.534	4.419
The first trimester	-4.00 ± 2.91	3.17 ± 3.55	0.095[a]	1.714	0.467	6.295
The second trimester	-5.37 ± 1.78	4.57 ± 1.28	<0.001*[a]	2.879	1.978	4.189
The third trimester	-1.76 ± 1.84	9.71 ± 1.22	<0.001*[a]	4.227	2.759	6.478

Notes: $\bar{X}$: Sample mean, SE: standard error; CI: Confidence Interval, *p<0.050 significant difference between group with independent T-test; [an] Independent T-test; [b] Mann-Whitney Test. **Abbreviations:** FFQ, Food frequency questionnaire

According to World Vision International, anaemia increases the risk of death for pregnant women with a haemoglobin level <70 g/L is 1.35 times and 3.5 times greater risk with haemoglobin <50 g/L[39]. The risk of increased mortality and morbidity due to anaemia in pregnant women is also a threat during this COVID-19 pandemic because it raises adverse effects like decreased immunity[40].

Based on National Family Planning Coordination Board, during the COVID-19 pandemic, 15 percent of Indonesia's female population is pregnant. There could be between 300.000 until 450.000 unplanned pregnancies or extra births, and would be a baby boom

occurs due to a decline in contraceptive use and work from home habits for married couples [41]. This condition can also increase the risk of anaemia if pregnant women ignore the risks of physical activity, balanced nutritional patterns, and adherence to consuming iron during pregnancy.

This study indicates that adherence to the consumption of iron supplements and dietary habits of respondents during pregnancy was the most significant factors that influence anemia in pregnancy. The pre-test conditions of most pregnant women in rural areas and the prevalence had anemia representing the percentages of 58.30% and 40.40%, respectively ($p>0.050$). One of the causes is the medication error in consuming iron supplements. As much as 37.38% in the control group took iron with milk or calcium supplements, and 41.22% took it with tea (Figure 3). Calcium and the chemical content of tea, such as tannin, cause a decrease in the effectiveness of absorption of iron supplements. Lack of education for health workers and awareness of pregnant women in improving health behavior during pregnancy will cause a high incidence of anaemia, which is detrimental to the health of the mother and the fetus's health.

The non-compliance of iron supplementation among pregnant women is due to forgetfulness (70.%) caused by the boredness of taking drugs daily, the side effects of nausea and vomiting, and hectic homework activities [42]. Low adherence to consumption iron supplementation before and during pregnancy will be associated with anaemia in pregnancy. This condition is more common in the low-income population and social affairs [43]. This is different from the research in Ghana, in which its anaemia prevalence was higher among rural residents than urban area [44]. The cause of anaemia is inadequate intakes of iron, zinc, folate, calcium and vitamin A. The most critical risk for microcytic and hypochromic anemia during pregnancy is micronutrient deficiencies [45].

In addition, physical activity reduce risk of excessive gestational weight gain, which is a predictor of iron deficiency [46][47]. Moderate-intensity physical activity during pregnancy at least 150 minutes is recommended, such as doing moderate-intensity aerobic. These activities are needed during pregnancy. Anemia can cause the insufficient oxygen-carrying capacity of the blood, which affects the activity of the cellular metabolism of the body [40].

The lower self-care of pregnant women towards their health is predisposition anaemia in pregnancy. One of the solutions is by increasing the role of pharmacy in providing a solution-based approach to addressing anaemia in pregnancy. The goal is a change in behavior during pregnancy following with the advice given by the counsellor to achieve therapeutic success.

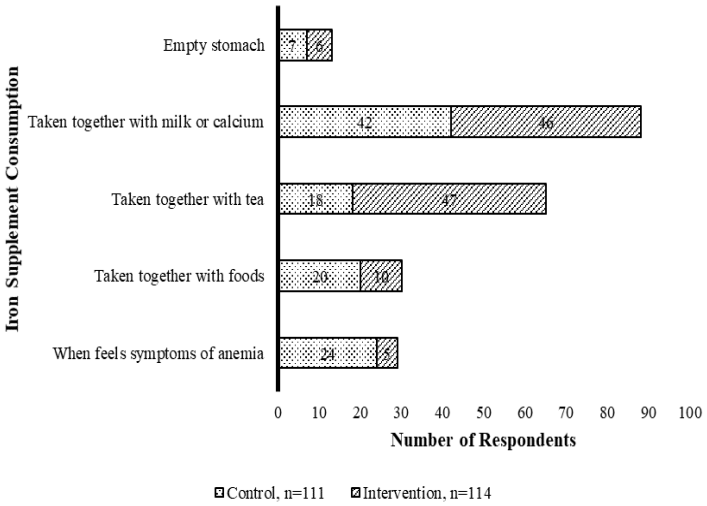

Figure 3 Pattern of iron supplement consumption

This research shows that the SFBC method can solve health problems by using supplements during pregnancy by pharmacists to change the stage of the behavior of pregnant women. Changes in respondents' readiness in implementing a healthy lifestyle during pregnancy through physical activity, nutrition patterns, and adherence to taking iron supplements. In this way, the mortality and morbidity of anemia during pregnancy in rural, middle, and urban areas decreases.

In addition, it is also known the main factors causing anemia and healthy lifestyle behavior during pregnancy. The results of this study can support the health between the fetus and mother during the COVID-19 pandemic. The limitation of this study, researchers did not see the impact of implementing unhealthy behaviors that cause anemia during pregnancy and the impact of the SFBC method on the babies born.

4. CONCLUSION

Solution-focused brief counseling (SFBC) by the pharmacist can change the stage of behavior during pregnancy to implement a healthy lifestyle, including managing physical activity and being adherent to take iron supplements. This pharmaceutical care method can reduce anemia during pregnancy through the antenatal care (ANC) program in Bantul and Yogyakarta, a Special Region of Yogyakarta, Indonesia.

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Supplementary Material: Figure S1-S4

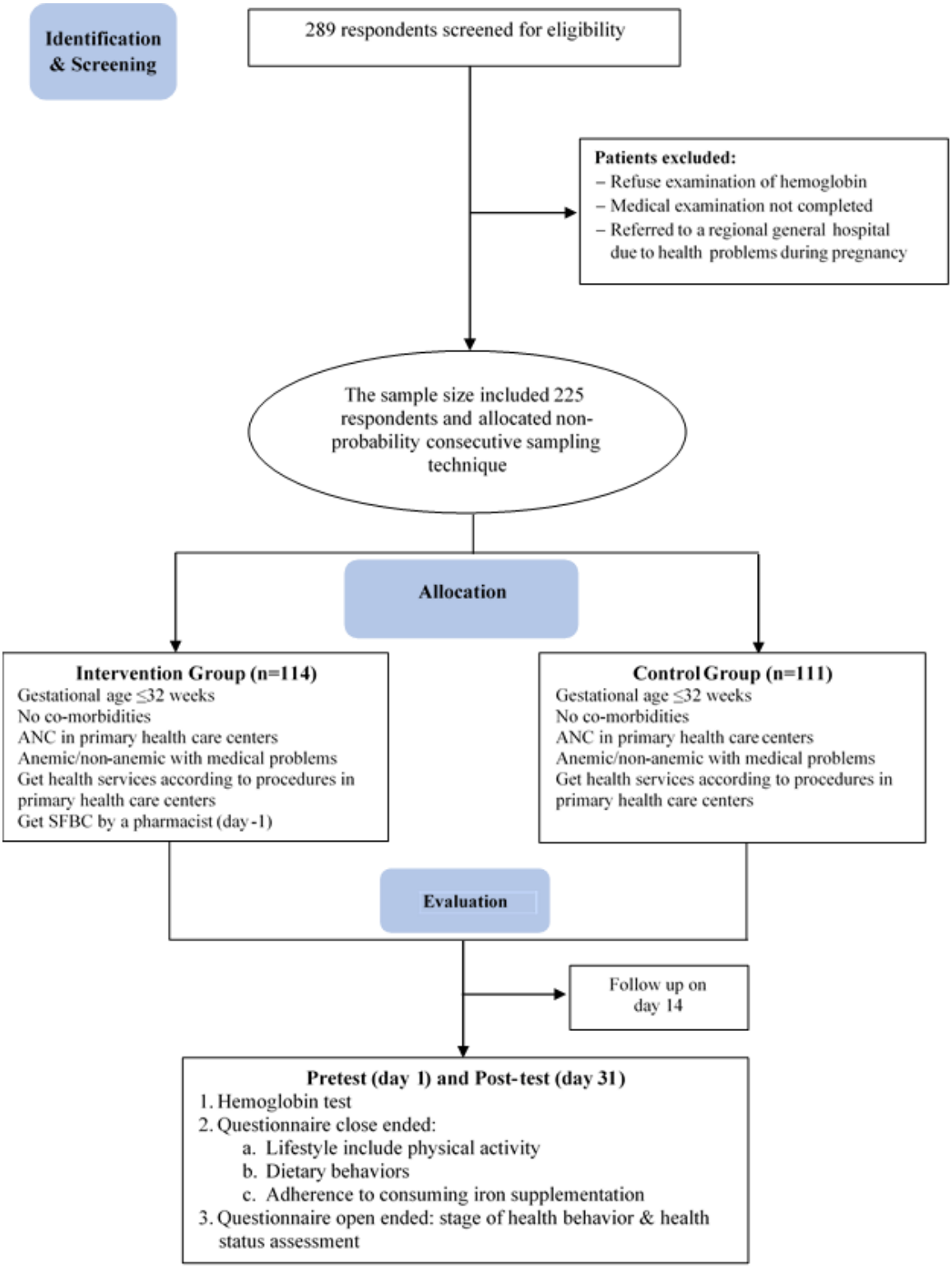


Figure S1 The procedure of a research during pre-test and post-test included follow-up respondents

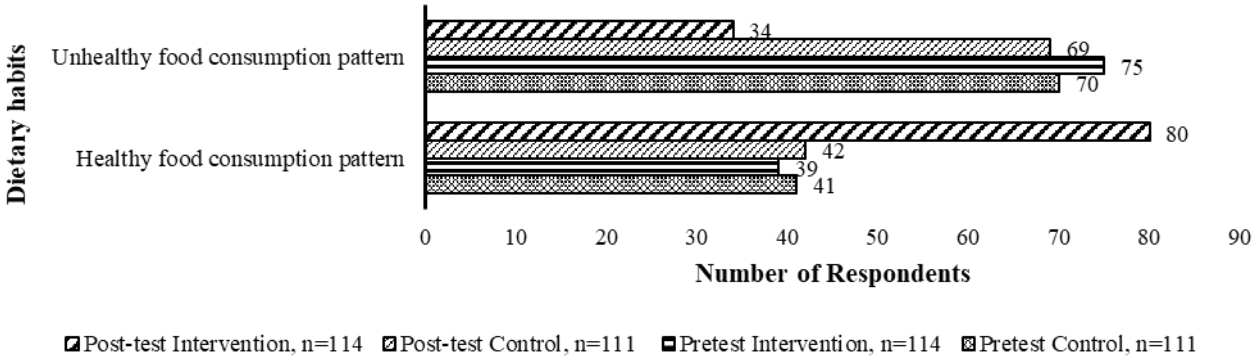


Figure S2 Dietary habits during pregnancy

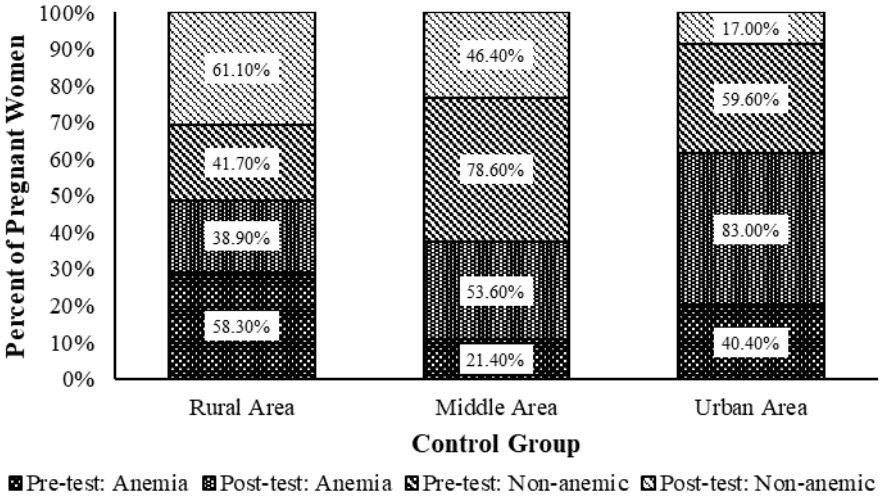


Figure S3 The results of hemoglobin examination in the pre-test and post-test control groups

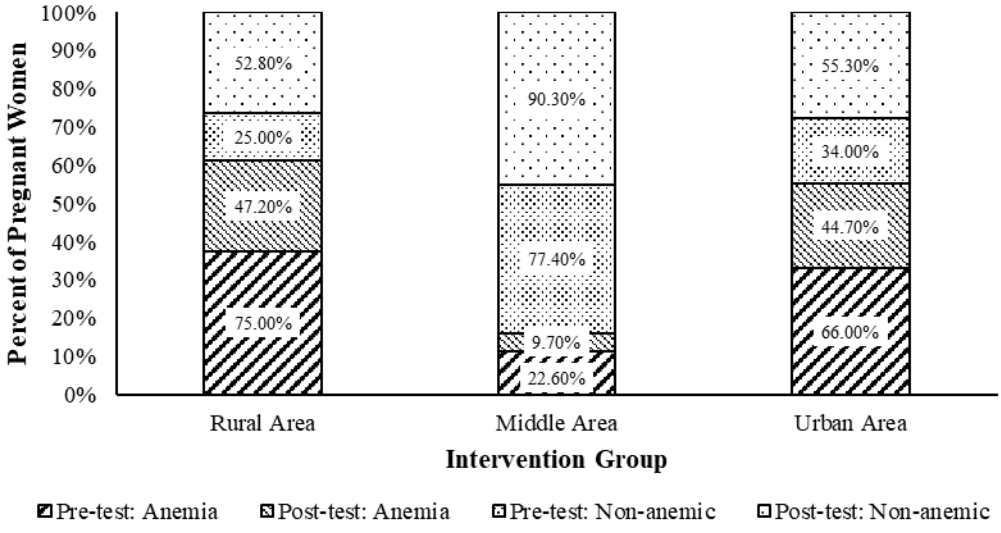


Figure S4 The results of hemoglobin examination in the pre-test and post-test control groups

Supplementary 1 Questionnaire for the Use of Iron Supplements during pregnancy

Time: 10 minutes
Instructions:
Put a checklist (√) on one of the choices YES or NO. You can choose according to your actual situation.

Question number	Question	Answer	
		Yes	No
(1)	Have you taken iron supplement during pregnancy?		
(2)	Do you always bring iron supplement when you travel or work?		
(3)	Do you use tea/milk when taking iron supplement?		
(4)	Do you take iron supplement 1 hour before meals or 2 hours after meals?		
(5)	Will you stop taking iron supplement if nausea/vomiting occurs?		
(6)	Will you only take iron supplement if you experience weakness, dizziness and fatigue during pregnancy?		
(7)	Have you every day for 1 month (30 days) have taken iron supplement?		
(8)	In addition to taking iron supplement, have you been consuming nutritious foods (green vegetables such as spinach, beans, and chicken liver) regularly?		
(9)	Have you checked your Hb (hemoglobin) value regularly during this pregnancy at least once a month?		
(10)	Have you ever forgotten to take iron supplement during the last four weeks?		
	Note: How many irons supplement tablets do you currently have? (Answer with number)		

Supplementary 2 Questionnaire for the Use of Iron Supplements during pregnancy

Patient Name: _____ _____ Counseling time: _____ minutes

ASSESSMENT:
Respondents' assessment of their preparation to make changes in treatment and a healthy lifestyle.
□ Precontemplation □ Contemplation □ Preparation □ Action stage.

ADVICE:
Counseling materials delivered to patients:
1. Anemia in pregnancy
   a. Understanding the process of anemia
   b. Symptoms of anemia
   c. Complications of anemia

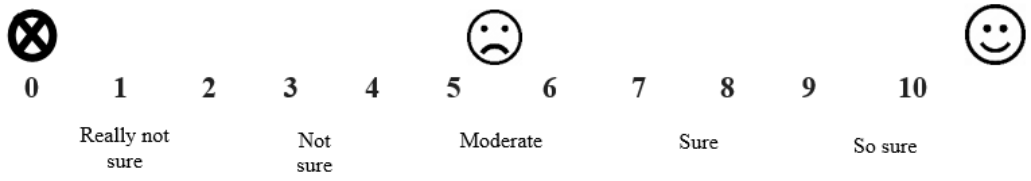
2. Management of the use of iron supplements or blood-boosting tablets in pregnancy
   a. Dietary habit
   b. Sport
   c. Drug therapy

3. Advantages and disadvantages of taking iron supplement for pregnant women and adopting a healthy lifestyle to support successful treatment/improve maternal and fetal health.
4. Duration of use of iron supplement during pregnancy
5. How to take tablets to add iron supplement
6. Side effects of iron supplement
7. How to manage the side effects of iron supplement both non-pharmacological and pharmacological

AGREE (Consent stage, patient and pharmacist collaborate to achieve adherence behavior change targets in anemia treatment):

I (AGREE / DISAGREE) to change the behavior, how to take medication correctly and apply a healthy lifestyle to achieve the goal therapy

How sure are you on this decision to achieve goal therapy of anemia and stay healthy during pregnancy?



ASSIST (The stage of identifying patient barriers, providing assistance to solve various problems faced by pa tients, providing a planned summary for treatment, and social support for behavior change)

- Symptoms experienced when not adhering to taking iron supplements during pregnancy:_____
  _____
  _____
- Triggers for non-adherence to taking iron supplements during pregnancy (social and environmental factors):
  _____
- Social support:
  _____
- How to overcome obstacles:
  _____

Signature,	
Respondent	Pharmacist