

**THE INFLUENCE OF PHARMACIST COUNSELING ON CHANGES IN HEMOGLOBIN LEVELS OF PREGNANT WOMEN AT A COMMUNITY HEALTH CENTER IN INDONESIA**

PUJI LESTARI HERYADI, RANI SAURIASARI\*, RETNOSARI ANDRAJATI

Department of Pharmacy, Faculty of Pharmacy, Universitas Indonesia, Depok, Indonesia. Email: rani@farmasi.ui.ac.id

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**ABSTRACT**

**Objectives:** Anemia during pregnancy is a common problem among women. Iron deficiency can result from low compliance to consuming iron supplement tablets (ISTs) as well as consumption patterns that may affect iron uptake. The purpose of this study was to provide knowledge regarding anemia during pregnancy, to increase adherence to consumption of IST, and to improve IST consumption patterns.

**Methods:** The study design was experimental with a randomized pre-post control design. There were 192 respondents who were divided into two groups: 96 respondents were not counseled and 96 respondents had received media leaflet counseling. The research was conducted at the community health center (CHC) of the Pagedangan Sub-district, Tangerang District, and Banten Province. All respondents were interviewed, and the hemoglobin (Hb) value was examined using the Hemocue Hb 301 Analyzer photometry method.

**Results:** The results were analyzed using a Chi-square test to assess significant differences between the two groups ( $p < 0.05$ ) and multivariate analysis was conducted using binary logistic regression. The results showed that the influence of counseling could increase the Hb value by 8.6 times compared to the non-counseling group ( $OR = 8.6$ ;  $p < 0.05$ ) after controlling for number of IST per month, consumption pattern of IST with calcium, consumption pattern of IST with foods/beverages that inhibit the absorption of iron, level of education, and gestational age.

**Conclusions:** Gestational age in the third trimester tends to increase the Hb value by 5.1 times compared with the first- and second-trimester gestations ( $OR = 5.1$ ,  $p < 0.05$ ). Thus, counseling from pharmacists can improve the success of anemia treatment in pregnant women in the CHC of the Pagedangan Sub-district, Tangerang District.

**Keywords:** Anemia, Counseling, Pregnancy women.

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**INTRODUCTION**

Anemia is a global health problem in both developing and developed countries and can affect health across all socioeconomic groups. The prevalence of anemia is highest among pregnant women (41.8%) and children (69%). Anemia in pregnant women falls into the category of serious health problems [1]. According to the World Health Organization (WHO), 32.8% of pregnant women experience iron deficiency anemia, and the prevalence of anemia in Southeast Asia is quite high (48.2%) [1]. In 2006, the WHO used data based on regression to estimate that 44.3% of Indonesians suffer from anemia [1]. The result of the Indonesian Health Survey in 2013 showed that 37.1% of pregnant women were anemic. According to the Ministry of Health (MoH) in 1999, the proportion of pregnant women with anemia in Indonesia is almost the same in urban (36.4%) and rural (37.8%) areas [2].

Anemia during pregnancy is associated with bleeding, a high maternal mortality of 20-25% low birth weight recurrent infection during the first 1000 days of birth, 37.2% stunting in children under the age of 5 years, a child who is overweight, and wasting (thin child) [2]. Anemia is prevalent in pregnant Indonesian women because women do not routinely consume the 90 blood booster tablets administered by the government (low compliance) although the Indonesian government has proclaimed the presence of a blood supplementation tablet program since the 1980s. According to the Indonesian health survey data, in 2013, only 33.3% of pregnant women consumed the iron supplement tablets (ISTs) during pregnancy. Another reason for the prevalence of anemia in pregnant Indonesian women is the lack of knowledge among pregnant women regarding consumption patterns of IST with foods/beverages that can inhibit iron absorption uptake.

The number of pregnant women who received iron (Fe) tablets in 2014 in the Banten province was only about 61.4% lower than the national data figure of 85.1% [3]. According to the Indonesian Health Survey, in 2012, 74% of pregnant women in Banten Province had taken IST during pregnancy, while only 32% of pregnant women had taken the 90 IST during pregnancy [4]. In Tangerang City, 85.7% of pregnant women received a sufficient amount of the 90 IST (Fe), this figure did not align with the incidence of a pregnant woman with anemia reported by the community health center (CHC) in Batuceper, which was 47.9% [5]. This data suggests that it is necessary to improve compliance to taking IST among pregnant women. Studies in Vadodara, India, show that periodic counseling, motivation, and strengthening by health personnel routinely increases compliance to iron tablet consumption [6].

Although pharmaceutical services were initially drug-oriented, they are now moving toward being more patient-oriented by offering services such as comprehensive pharmaceutical care [7]. Pharmaceutical care is a form of service that is committed to improving patients' quality of life. Counseling is a clinical pharmacy service that aims to improve a patient's knowledge and understanding of a drug as well as to provide methods for solving a patient's problem regarding a drug [7]. Counseling is a part of the patient and health-care communications conducted by clinical and community pharmacists and has proven to be quite useful for improving patient compliance [8]. Counseling regarding anemia during pregnancy can include describing how anemia is caused by obedience factors in the consumption of IST and describing the benefits of hemoglobin (Hb) examination during pregnancy as well as the consequences of not curing anemia during pregnancy. This study examines the influence of apothecary counseling that aimed to increase

Hb in pregnant women. The research was conducted at the CHC of the Pagedangan Sub-district, Tangerang District.

## METHODS

This study used an experimental design with independent groups (pre-post design), which measured Hb level value before and after the intervention. In this design, the respondents were divided into groups: No counseling and counseling with a media leaflet. The data were obtained prospectively, and sampling was conducted using a randomized pre-post control design. The sample population in this study was all pregnant women who were examined at the CHC of the Pagedangan Sub-district, Tangerang District. Respondents were included in the study if they met all of the following inclusion criteria: Pregnant women who received Antenatal Care and were examined at the CHC of the Pagedangan Sub-district, Tangerang District; women in the first, second, or third trimester of pregnancy; women of ages I, II, or III; and women who received IST through the government program. Respondents who were at 9 months of gestation and/or had HIV/AIDS comorbidities, epilepsy, intestinal worms, thalassemia, and other blood disorders were excluded from the study. Respondents could resign from participating in the study at any time without needing to obtain the researcher's permission.

The respondents consisted of two groups: Those who did not receive counseling and those who did receive counseling. All respondents in both groups performed pre-test, which involved measuring their Hb value and responding to a preliminary questionnaire. A post-test was done after the respondents received no intervention or the intervention. All respondents' Hb levels were measured using the Hbocue 301 Analyzer Hb, a Swedish production. The level of respondents' compliance was determined by calculating the number of residual IST that had been given to know the number of IST that had been consumed for 30 days. Determining the consumption patterns of calcium and IST and consumption/food intake patterns that inhibited iron uptake was done before and after the intervention in the counseling group, whereas in the non-counseling group this was performed after 30 days of observation. All the results were analyzed using univariate analysis to obtain the frequency distribution and proportions. For the bivariate analysis using Chi-square and the multivariate test using Binary

logistic regression, all data were analyzed and evaluated using SPSS V.23. A research permit was granted by the Tangerang District Health Department (No.423.6/591.Dinkes), and the study passed the ethics test of FKUI-RSCM NO. 968/UN2.F1/ETIK 2016.

## RESULTS

This research was conducted at the CHC of the Pagedangan Sub-district, Tangerang District and covered 13 Villages: Karang Tengah, Central Malang, Jatake, Situ Gadung, Kadu Sirung, Cicalengka, Pagedangan/Puspipstek, Cicayur, Lengkong Kulon, Cihuni, Cijantra, Medang-Anggrek, and Medang-Cempaka. The area covered by the CHC is 464,607 Ha, and the Pagedangan CHC covers 86 integrated post [9]. Its facilities include general health, dental health, pediatric health, maternal and child health, immunization, TB services, Sexually-transmitted infection services, nutrition consultation, visual inspection of acid, geriatric services, leprosy services, and laboratory services. In this study, the respondents were divided into two groups: Non-counseling and counseling. The women's sociodemographic characteristics are provided in Table 1.

The Chi-square analysis indicated the differences between the two groups. The gestational age did not differ significantly between the two groups ( $p>0.05$ ). In this study, most of the pregnant women visited the CHC during their third trimester of pregnancy (46.88%). Mother's age was divided into two groups: 21-35 years old is not at risk while  $<21$  years and  $>35$  years is risky. Maternal age between the two groups did not differ significantly ( $p>0.05$ ). In the non-counseling group, 16 respondents (16.7%) were at a risky age, and 80 respondents were at a not risky maternal age (83.3%). In the counseling group, 75 respondents were at a risky age (78.1%) and 21 respondents were at a not risky age (21.9%). The education level between the two groups was not significantly different ( $p>0.05$ ). Almost all of the respondents were junior high school graduates with a total of 90 respondents (46.9%), and 48 respondents were high school graduates (25%). The level of education affected respondents' use of health services and iron consumption for increasing Hb value during pregnancy [10]. A high education level indicates that respondents are ready to receive information and knowledge given by the counselor. According to MoH [7], the higher the education level, the lower the prevalence of anemia. According to the results of the current study, the

**Table 1: Respondents' sociodemographic data**

Characteristics	Non-counseling n=96 (100%)	Counseling n=96 (100%)	p-value
Gestational age			
1 <sup>st</sup> trimester	21 (21.9)	20 (20.8)	0.110
2 <sup>nd</sup> trimester	24 (25)	37 (38.5)	
3 <sup>rd</sup> trimester	51 (53.1)	39 (40.6)	
Mother's age			
Not at risk (21-35 years)	80 (83.3)	75 (78.1)	0.460
Risky (<21 years or >35 years)	16 (16.7)	21 (21.9)	
Level of education			
Not completed primary school	2 (2.1)	3 (3)	0.230
Primary school graduate	22 (22.9)	18 (18.8)	
Junior high school graduate	48 (50)	42 (43.8)	
Senior high school graduate	23 (24)	25 (26)	
Associate's degree graduate	0	4 (4.2)	
Bachelor's degree graduate	1 (1)	4 (4.2)	
The duration of calcium consumption with IST			
At the same time	47 (49.0)	0	<0.001
Not at the same time	49 (51.0)	96 (100)	
Along with food/beverage inhibiting iron absorption			
Not at the same time	82 (85.4)	93 (96.9)	0.009
At the same time	14 (14.6)	3 (3.1)	
Number of IST per month			
0-15 tablet	42 (43.8)	13 (13.5)	<0.001
16-30 tablet	51 (53.1)	20 (20.8)	
31-45 tablet	2 (2.1)	47 (49.0)	
46-60 tablet	1 (1.0)	16 (16.7)	
Total	96 (100)	96 (100)	

higher the education level the pregnant woman has, the higher her level of compliance is to taking IST [11]. The respondents' clinical results are organized by the amount of consumed IST, consumption patterns between calcium tablets and IST, and consumption patterns of food/beverages that can inhibit the absorption of iron, as shown in Table 1.

The results showed that consumption of IST was significantly different in both groups ( $p < 0.05$ ). This suggests that counseling can increase a pregnant woman's awareness to consume IST compared to women who are not counseled. The number of IST given is expected to increase the value of Hb. According to Indonesia health survey [2], the minimum recommended consumption of IST is 90 tablets during pregnancy. IST with a Ferrous Fumarate composition is equivalent to 60 mg of iron. Counseling affects the amount of IST consumed, thus increasing the Hb value. The percentages of women in the group that was not counseled who consumed IST in the different ranges were as follows: 0-15 tablets, 43.8%; 16-30 tablets, 53.1%; 31-45 tablets, 2.1%; and 46-60 tablets, 1.0%. In the counseling group, the percentages were as follows: 0-15 tablets, 13.5%; 16-30 tablets, 20.8%; 31-45 tablets, 49.0%; and 46-60 tablets, 16.7%. According to the MoH, the number of blood booster tablets recommended by the government is at least 90 tablets during pregnancy. The patient compliance to the consumption of IST in Indonesia is still very low due to lack of knowledge regarding IST, iron absorption factors, and eating foods that can interfere with iron uptake [12]. The differences in consumption patterns of calcium tablets and IST in pregnant women were significantly different between the two groups ( $p < 0.05$ ). Counseling affects calcium consumption patterns as well as iron consumption patterns. In the counseling group, calcium was consumed together with IST that were given 1-2 hrs before. The non-counseling group indicated 47 respondents (49.0%) who consumed calcium together with IST 49 respondents (51.0%) demonstrated a consumption pattern in which the calcium and iron consumption was not simultaneous. Table 2 summarizes the average consumption pattern of calcium tablets and IST in both groups.

The consumption pattern of calcium and IST was significantly different between the before and after intervention conditions in the counseling group ( $p < 0.05$ ), whereas the consumption pattern of calcium and IST did not differ significantly in the non-counseling group ( $p > 0.05$ ). The pattern of consumption in the counseling group is different because respondents have been given knowledge and education so that incorrect habits can be improved. Calcium is a supplement given during pregnancy that is useful for bone growth in the fetus. However, 300 mg-600 mg of calcium consumed along with iron interferes with heme iron absorption by 40% [13]. The  $\text{Ca}^{2+}$  mechanism that inhibits the uptake of  $\text{Fe}^{2+}$  remains unclear [14]. The initial dose of calcium can inhibit heme iron by 50 mg [13]. The effect of iron inhibition occurs during the transport phase of iron across the basolateral membrane from enterocytes to plasma [15]. Iron absorption involves the hDMT1 transporter; the action of this transporter can be inhibited in the presence of  $\text{Ca}^{2+}$ .  $\text{Ca}^{2+}$  inhibits  $\text{Fe}^{2+}$  in a non-competitive manner with low affinity [13]. The food/beverage consumption pattern can affect iron absorption. In the research result, the consumption pattern was significantly different

between the two groups ( $p < 0.05$ ). This is because the counseling group is given knowledge regarding anemia and the food/beverage interactions that can inhibit iron absorption, unlike the non-counseling group. The food that can inhibit iron absorption includes milk or dairy products and tea. Table 2 summarizes differences in consumption patterns of foods/beverages that interfere with iron uptake in both groups.

The pattern of food/beverage intake that interfered with iron uptake was significantly different between before and after intervention in the counseling group ( $p < 0.05$ ), whereas the pattern did not differ significantly between before and after in the non-counseling group ( $p > 0.05$ ). In the counseling group, 93 respondents (96.9%) did not simultaneously consume food/beverages that inhibit iron uptake, while 3 respondents (3.1%) did engage in concurrent consumption. In the non-counseling group, 82 respondents (85.4%) took time between taking the IST and consuming drinks such as tea and milk, while 14 respondents (14.6%) did not take time between taking the IST and consuming drinks such as tea and milk. Foods/beverages containing polyphenols can inhibit heme iron uptake by forming chelates with iron. Epigallocatechin-3-gallate inhibits absorption by decreasing iron expenditure from basolateral membranes [16]. One cup of tea (200 mL) can inhibit 75-80% of iron uptake while one cup of coffee can reduce iron absorption by 60% [13]. Pharmacist counseling services is a discussion activity between pharmacists and pregnant women in which the former provides support and encouragement so that the latter gains confidence in problem-solving. Drug counseling is a form of education that determines how well a respondent understands the importance of IST consumption for minimizing the incidence of anemia in pregnancy. Counseling is a gold standard in providing information and is effective in providing good outcomes. Pharmacist counseling was conducted by researchers at the CHC with the help of leaflet media. Counseling services are actively initiated by the pharmacist. Counseling can reduce non-compliance in the use of IST supplements as well as IST consumption patterns that can inhibit iron uptake. The method for improving compliance included communication, providing appropriate information, and preventing non-compliance [7]. Counseling can improve respondents' compliance to consume IST, and the increase in consumption of IST increases the value of Hb in pregnant women. Table 2 summarizes the average pretest-posttest values of the two groups.

The mean Hb value was significantly different ( $p < 0.05$ ) between before and after pharmacist counseling with an increase of 1.13 g/dL. In the group that did not receive counseling, the Hb value did not differ significantly between before and after ( $p > 0.05$ ). Multivariate analysis was conducted to determine the most influential factor in the changes of Hb value. In this research, binary logistic regression analysis was performed. Based on the results of the test, the group subjected to counseling had an increase of 8.6 times when compared with the group that was not subject to counseling after controlling for number of IST per month, consumption pattern of IST with calcium, IST consumption pattern with food/beverage that inhibited the absorption of iron, education level, and gestational age. These results suggest that pharmacist counseling may increase Hb value during pregnancy. Gestational age in the third trimester tends to increase the Hb value by 5.1 times when compared with the first- and second-trimester gestations (OR=5.1,  $p < 0.05$ ). This is due to the increased awareness of the woman regarding the importance of maintaining a high Hb value before giving birth. Enhancement of the Hb value in the third trimester determines the weight of the baby because the fastest growth occurs during this trimester, thus increasing the need for iron and other micronutrients. The incidence of anemia occurring in the third trimester increases the chances of low birth weight infants by 6.5% and premature birth by 11.5% compared to the incidence of anemia in the first- and second-trimesters [17].

## CONCLUSION

This study showed that pharmacist counseling may help increase Hb value during pregnancy. Further, studies are warranted to develop effective interventions.

**Table 2: Calcium tablet and iron supplement tablet consumption patterns in both groups**

Groups	Before	After	p-value
Calcium and IST consumption pattern			
Counseling	0.38±0.49	1.0±0.0	<0.001
Non-counseling	0.51±0.5	0.51±0.5	1.00
Food consumption pattern along with IST			
Counseling	0.27±0.45	0.03±0.17	<0.001
Non-counseling	0.15±0.35	0.15±0.35	1.00
Hb Value (g/dL)			
Counseling	10.39±1.24	11.52±0.92	<0.001
Non-counseling	11.21±1.24	11.28±11.53	0.300

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