

## ORIGINAL ARTICLE

# The Effect of Compliance of Intake of Fe Tablets through the WhatsApp Group Messenger Program for Pregnant Women on the Increase in Hb Level at the Garuda Health Center, Bandung City

Fardila Elba<sup>1</sup>, Eneng Daryanti<sup>2</sup>, Sandeep Poddar<sup>3</sup>, Sandeep Shrestha<sup>4</sup>

<sup>1</sup> Universitas Padjadjaran, Indonesia

<sup>2</sup> Universitas Bhakti Kencana, Indonesia

<sup>3</sup> Lincoln University College, Wisma Lincoln, No. 12-18, SS6/12, Off Jalan Perbandaran, 47301 Petaling Jaya, Selangor D. E. Malaysia

<sup>4</sup> International Education School, Qiqihar Medical University, Heilongjiang Province, Qiqihar City, P.R.China

## ABSTRACT

**Introduction:** Pregnant women often experience anemia during pregnancy. Efforts to increase intake of Fe tablets by providing reminders via WhatsApp Messenger are a strategic step to increase Hb levels in pregnant women. The research objective was to determine the reasons for low level of compliance among pregnant women regarding the intake of Fe tablet effecting Hb levels thereby increasing the incidence of anemia. The study also detects the improvement of adherence with the consumption Fe tablets in pregnant women before and after being given reminders via WhatsApp Messenger. **Methods:** The research was conducted at the KIA Poli Puskesmas Garuda, Bandung City. This type of quantitative research uses pre-experimental design and one group pre-test post-test design. The sample of this study was 100 pregnant women obtained by the Consecutive Sampling technique from 1838 populations. **Results:** The multivariate results showed that the hemoglobin levels of pregnant women before and after receiving the reminder had an average increase of 9.838. The result of the post-test was 10.452 with  $p=0.000$ . **Conclusions:** There is an influence on the level of compliance of pregnant women in consuming Fe tablets on the incidence of anemia at Garuda Health Center, Bandung City after being given a reminder via WhatsApp Messenger.

**Keywords:** Anemia, Pregnant women, WhatsApp Messenger

## Corresponding Author:

Fardila Elba, M.Keb

Email: fardilaelba@yahoo.com

Tel: +6281394427772

## INTRODUCTION

Pregnant women with anemia are still common in developing countries like Indonesia. Anemia is a condition in which erythrocytes or hemoglobin circulating throughout the body is unable to fulfill its function to provide oxygen to all body tissues. One of the causes of indirect death in pregnant women is anemia. Not only during pregnancy, but anemia can also have a negative impact during childbirth until the puerperium (1,2). Anemia in pregnant women is mostly caused by iron deficiency. The prevalence of iron deficiency anemia is still relatively high, there are about 30% more than the human population in the world experiencing iron deficiency anemia. During pregnancy, the need for iron in pregnant women increases, this causes pregnant women to develop high risk of developing iron-deficiency anemia (3).

The occurrence of anemia is caused by a decrease in hemoglobin levels in the blood. The blood of normal pregnant women contains 13-16g hemoglobin (Hb) / 100cc. If the Hb concentration falls below normal values, it will cause anemia. Pregnant women are said to be anemic if their Hb level is  $<10.5$  g / dL. Pregnant women who are anemic will experience a lack of oxygen for the vital organs of the mother and fetus due to decreased hemoglobin (Hb) levels. The decrease in hemoglobin levels can be caused by insufficient nutritional intake, which inhibits the formation of hemoglobin components, especially iron (Fe). Anemia during pregnancy can be caused due to the bleeding before or after delivery, increasing the risk of giving birth to a baby with low birth weight, and severe anemia can cause death (4). Placental morphometry in post-partum mother has also been reported (5). Although genetic factors are involved (6) the most common cause of anemia in pregnancy is a lack of knowledge about nutritional needs which causes pregnant women to suffer from iron deficiency anemia. It is important to check for anemia at the first visit of pregnancy. Even if there is no anemia at the first visit, it is still possible to develop anemia in a later stage of

pregnancy.

Iron deficiency anemia in pregnant women can be controlled by giving blood-booster tablets (60 mg elemental iron and 250 µg of folic acid). One of the factors that cause iron deficiency anemia in pregnant women is the low compliance of mothers in consuming Fe tablets. In 2015, there were 74.16% of pregnant women who were declared non-compliant in consuming iron tablets (7). The needs for iron would be fulfilled if pregnant women were obedient regarding the consuming Fe tablets. One of the factors contributing to the incidence of anemia in mothers is influenced by awareness and adherence in consuming Fe tablets. Excess iron consumption has toxic effect as well (8).

The accuracy of dosage, consumption method, and time of consumption of Fe tablets per day is the basis of compliance (9). According to the results of the 2018 Basic Health Research, the proportion of anemia in pregnant women in Indonesia was 48.9%, where this number increased by 11.8% compared to 2013. The Bandung City Health Profile 2018 recorded the distribution of Fe tablets once (Fe1) to mothers or pregnant women. About 43,084 pregnant women or 96.99% of all pregnant women (estimated) in Bandung City were given Fe1 tablets. Pregnant women with Fe3 tablets were 42,084 or 94.74%. 999 pregnant women did not get Fe tablet 3 times (Fe3) after getting Fe1 (10).

Compliance is a change in behavior from behavior that does not obey the rules. The problem of compliance is obstacle to daily iron supplementation, therefore to maintain compliance with iron supplement consumption, efforts can be made by providing reminders via WhatsApp Messenger to pregnant women. The results of research conducted by Yuniarti et al. in 2015 showed that compliance regarding Fe tablets consumption was influenced by two main factors, namely role of health workers and factors such as awareness in consuming Fe tablets. Adherence in consuming Fe tablets has a significant relationship with an increase in hemoglobin levels (11).

Innovative and more modern methods of communication have been introduced to improve treatment compliance so that health services are not restricted to face-to-face interaction. Smartphones have several applications including WhatsApp, Instagram, email, short message service (SMS) and others according to the needs of the user (12). Android-based Electrical Power and Distribution Subsystem application is nowadays used in detection of Postpartum depression (PPD) (13).

## MATERIALS AND METHODS

This research is quantitative research with a pre-experimental research design with a one-group pretest-posttest design, which was conducted from October-

November 2019. This study used a total sampling where 100 pregnant women were found. The research subjects were women performing pregnancy checks at the Garuda Health Center, Bandung City. Data were obtained through questionnaires and measuring the Hb levels obtained at pretest. The level of Hb was then measured post-test, for one month the respondents received a reminder via WhatsApp Group Messenger regarding Fe tablet consumption. The data analysis in this study was univariate, bivariate, and multivariate analysis using paired T-test. This study had received the ethical clearance from the Ethics Committee of Padjadjaran University Bandung, Indonesia (ethical clearance no. 1114 / UN6.KEP / EC / 2019).

## RESULTS

Based on the research results, most of the respondents' age ranged from 20-35 years, as many as 85 pregnant women (85%). Most of the respondents graduated from high school / vocational school with 63 pregnant women (63%). Based on parity, some respondents are in the multiparity parity category, namely 68 pregnant women (68%) and the least number is the grandemultipara category, namely 4 pregnant women (4%). The majority of respondents had never received education about anemia, namely as many as 86 pregnant women (86%) while the respondents who had received education about anemia were 14 pregnant women (14%) (Table I).

**Table I: Frequency Distribution of Respondent Characteristics**

Characteristics	f	%
<b>Age</b>		
<19	7	7
20-35	85	85
>35	8	8
<b>Total</b>	<b>100</b>	<b>100</b>
<b>Education</b>		
Middle School	22	22
High School	63	63
Diploma/bachelor	15	15
<b>Total</b>	<b>100</b>	<b>100</b>
<b>Parity</b>		
Primipara	28	28
Multipara	68	68
Grandemultipara	4	4
<b>Total</b>	<b>100</b>	<b>100</b>
<b>Experience of education on anemia</b>		
Ever	14	14
Never	86	86
<b>Total</b>	<b>100</b>	<b>100</b>

Table II shows that 29 pregnant women (29%) had high adherence to pre reminder WhatsApp Group Messenger, 57 pregnant women (57%) had moderate adherence and 14 pregnant women (14%) had low adherence levels. The results of WhatsApp Messenger post reminders were 52 pregnant women (52%), moderate adherence was 38 pregnant women (38%) and low compliance was 10 pregnant women (10%). Most of the respondents had mild anemia pre reminder WhatsApp Group, as many as 69 pregnant women (69%). Meanwhile, the results of the Hb level examination after being given a reminder

**Table II: Frequency Distribution of Respondent Characteristics Based on Level of Compliance and Incidence of Anemia Pre and Post Reminder WhatsApp Group Messenger**

Characteristics	Pre Test		Post Test	
	f	%	f	%
<b>Medication Adherence</b>				
High	29	29	52	52
Medium	57	57	38	38
Low	14	14	10	10
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>
<b>Anemia</b>				
Mild Anemia	69	69	91	91
Moderate Anemia	27	27	8	8
Severe Anemia	4	4	1	1
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

for one month showed an increase, where there were 91% of pregnant women who had mild anemia (91%).

The results of cross tabulation of pre-reminder WhatsApp Group Messenger Hb levels showed that 37 pregnant women (37%) who had high adherence had moderate anemia (Table III).

**Table III: Comparison of the level of compliance of pregnant women with the incidence of anemia pre reminder WhatsApp**

Variable	Incidence of Anemia						Total	P value
	mild anemia		moderate anemia		severe anemia			
Medication Adherence	f	%	f	%	f	%		
High	27	27	2	2	0	0	29	0.000
Medium	37	37	17	17	3	3	57	
Low	5	5	8	8	1	1	14	
Total	69	69	27	27	4	4	100	

The results of cross tabulation of WhatsApp Group Messenger post reminders of respondents who experienced mild anemia had high adherence as many as 51 pregnant women (51%), while respondents who had severe anemia had low adherence (Table IV).

Table V shows the average pre and post reminder Hb level after examination for WhatsApp Group Messenger increased from 15.342 to 16.048. The results of the analysis using the Paired T Test showed that the p value was 0.000, which means that there was an effect of giving a reminder to drink Fe tablets on the increase in Hb levels in pregnant women.

## DISCUSSION

### Characteristics of pregnant women in compliance with Fe tablet consumption to Hb levels

Based on Table I, it can be seen that most of the respondents were 20 to 35 years of age, as many as 85

**Table IV: Comparison of the level of compliance of pregnant women to the incidence of post reminder Whatsapp anemia**

Variable	Incidence of Anemia						Total	P value
	mild anemia		moderate anemia		severe anemia			
Medication Adherence	f	%	f	%	f	%		
High	51	51	1	1	0	0	52	0.000
Medium	33	33	5	5	0	0	38	
Low	7	7	2	2	1	1	10	
Total	91	91	8	8	1	1	100	

**Table V: The Effect of Compliance with Drinking Fe Tablets through the WhatsApp Group Messenger Program for Pregnant Women on the Increase in Hb**

Variable	Measurement		P Value
	Pre-test	Post-test	
<b>Knowledge</b>			0.000
Mean (SD)	15.342±4.096	16.048±4.221	
Median	10.0	10.5	
Range	3.90	2.80	

pregnant women (85%). This is in line with the research conducted by Martini in 2018 where mothers were aged 20-35 years being in the productive age group, where they have maturity in rational and motoric terms. Most of the respondents are in the productive age group, so they will be able to analyze their needs, one of which is the need for iron during pregnancy to prevent anemia. Pregnant women in the younger age group tend to be disobedient because they feel less prepared and do not understand the importance of Fe tablets (14).

The differences in education levels result in differences in the knowledge obtained by respondents about the consumption of Fe tablets. The level of education is related to the ability of the subject to understand health information obtained. The better the level of education, the better the information will be received. High education in pregnant women will also increase awareness in pregnant women in consuming quality foods to increase iron in the body other than those obtained from Fe tablets(15). Based on table I, it can be seen that respondents with higher education level are 63 pregnant women who have graduated from high school (63%). The background of pregnant women also affects adherence to taking Fe tablets.

Based on table I, it can be seen that the respondents with the highest number of parity were multigravidas as many as 68 pregnant women (68%). According to research conducted by Dewi et al.,(2017) pregnant women who have more than 1 child tend to have more experience about pregnancy and childbirth than pregnant women who have never been pregnant or gave birth before(16).

The more frequent contacts are made between mothers and counselors, the more often mothers get information regarding pregnancy that indirectly increases knowledge. Another benefit of the educational experience is the repetition of information which is a supporting factor in the mother's understanding of the information. This research is in line with another research, where the provision of information or knowledge that is frequent and repeated can increase the knowledge of a pregnant woman (17).

### Comparison of the Level of Compliance of Pregnant Women to the Incidence of Anemia

A pregnant woman can be said to be obedient in consuming Fe table if the pregnant woman consumes Fe table every day and the amount of Fe tablet taken is at least for 90 consecutive days during pregnancy. One simple way to measure compliance is by using a questionnaire. Based on Table II, pregnant women who have high adherence to pre reminder WhatsApp Group Messenger are 29 pregnant women (29%), 57 pregnant women (57%) have moderate levels of adherence and 14 pregnant women (14%) have low levels of adherence. In case of post reminder by WhatsApp Messenger as many as 52 pregnant women (52%) had high adherence, moderate adherence 38 pregnant women (38%), and low adherence 10 pregnant women (10%). Most of the respondents had mild anemia pre reminder WhatsApp Group, as many as 69 pregnant women (69%). Meanwhile, the results of an examination of Hb levels after being given a reminder for one month showed an increase, where the pregnant women who had mild anemia were 91 pregnant women (91%). The number of respondents who have a low level of adherence is many, this is due to several reasons, including forgetfulness, side effects, namely nausea, and not having control over returning to the public health center. Based on Table II, it can be seen that there are still 4 respondents (4%) who have severe anemia and 27 respondents (27%) have moderate anemia. Pre Hb level is the Hb level of pregnant women before being given treatment for 1 month, namely a reminder via WhatsApp Group Messenger.

During pregnancy, the need for iron increases, it cannot be met from foods containing iron only, so pregnant women must consume Fe tablets. The pre reminder in WhatsApp Group Messenger to the group with low hemoglobin level can be influenced by several factors, including diet, age, parity, environment, and compliance. There are still cases of anemia in pregnant women because pregnant women have a low level of compliance in consuming Fe tablet during pregnancy. Anemia in pregnant women is very common because in pregnant women there is a twofold increase in iron requirements due to an increase in blood volume without plasma volume expansion, to meet the needs of the mother and fetal growth. It is estimated that 52% of women do not have adequate iron stores during

pregnancy, so the risk of iron deficiency or anemia increases with pregnancy (4).

The results of cross-tabulation of pre-reminder WhatsApp Group Messenger Hb levels showed that 37 pregnant women (37%) who had high adherence had moderate anemia. Meanwhile, the results of cross-tabulation of WhatsApp Group Messenger post reminders of respondents who had mild anemia had high adherence as many as 51 pregnant women (51%), while respondents who had severe anemia had low adherence. The pregnant women often forget, and their husband or family does not support them. Apart from that ignoring recommendations from health workers about the number of tablets that should be consumed during pregnancy, and ignoring the proper way to consume Fe tablet is also noted.

### The Effect of Adherence of Pregnant Women on the Increase in Pre and Post Reminder Hb Levels via WhatsApp Group Messenger

The results showed that the average effect of the level of adherence toward taking Fe pre and post reminder WhatsApp Group Messenger on Hb levels increased from 15.342 to 16.048. The results of statistical tests using the Paired T-Test showed that the p-value was 0.000, which means that there was an effect of adherence to taking Fe tablets which increased the hemoglobin level of pregnant women through WhatsApp Group Messenger reminders. The results of this study are in line with research conducted by Deti Dwi in 2015 where there was an effect of health education and SMS reminders on the compliance of pregnant women in consuming iron tablets. Health education and SMS reminders can be used to remind and monitor the compliance of pregnant women in consuming iron tablets (18). The results of this study are also in line with other studies which stated that there was a relationship between the consumption of Fe tablets and the incidence of anemia in pregnant women in the second and third trimesters of pregnancy (19). Another study showed that there was a relationship between the consumption of Fe tablets and the incidence of anemia. Thus, consumption of Fe tablets was a controlling factor for the incidence of anemia and may affect pregnancy, because pregnant women tend to experience deficiency of both iron and folate (20). intervention. Therefore, WhatsApp reminder can be considered as a means to improve self-efficacy of the intake of Fe tablets compliance in order to increase hemoglobin level among pregnant women (21).

### CONCLUSION

The results of present study showed that there was a significant effect in the increase of the level of maternal compliance in consuming Fe tablet in relation to the increase in Hb levels through WhatsApp Group Messenger post reminder ( $p = 0.000$ ). There is a significant difference in effective adherence with

consuming Fe tablets in pregnant women pre and post WhatsApp Messenger. Health service agencies may take into consideration the collective provision of health awareness promotion together with WhatsApp reminder to enhance the adherence of the anemic pregnant women in the intake of Fe tablets in increasing Hb levels.

## ACKNOWLEDGMENT

Authors are very thankful to KIA Poli Puskesmas Garuda, Bandung City and Lincoln University College for supporting this research.

## REFERENCES

1. Sari, Sagita Darma. Pregnancy, Childbirth, Bati Preterm & Postterm Accompanied by Evidence Based. Palembang: Noerfikri; 2017.
2. Simbolon, Demsa. Nutritional Education Module for Prevention and Overcoming Chronic Energy Deficiency (Keke) and Anemia in Pregnant Women. Yogyakarta: Deepublish; 2018.
3. World Health Organization. World health statistics 2015. World Health Organization; 2015 May 14.
4. Abu-Ouf NM, Jan MM. The impact of maternal iron deficiency and iron deficiency anemia on child's health. *Saudi medical journal*. 2015;36(2):146.
5. Rejeki S, Aifa SA, Meikawati W, Poddar S. Placental Morphometry In Post-Partum Mother With Anemia Running title: Placental Morphometry. *European Journal of Molecular & Clinical Medicine*. 2020 Nov 1;7(6):110-5.
6. De M, Halder A, Podder S, Sen R, Chakrabarty S, Sengupta B, Chakraborty T, Das U, Talukder G. Anemia and hemoglobinopathies in tribal population of Eastern and North-eastern India. *Hematology*. 2006 Oct 1;11(5-6):371-3.
7. Sivanganam S, Weta W. Gambaran tingkat kepatuhan ibu hamil mengkonsumsi tablet besi di wilayah kerja puskesmas Sidemen tahun 2015. *Intisari Sains Medis*. 2017;8(2):135-8.
8. Poddar S, Talukder G, Sharma A. Chromosome damage induced by ferric chloride in human peripheral lymphocytes. *International Journal of Human Genetics*. 2004 Dec 1;4(4):261-4.
9. Indonesian Ministry of Health. Indonesia Health Basic Research Results (Risksdas) in 2018. Jakarta: Indonesian Ministry of Health's Health Research and Development Agency; 2018.
10. Bandung City Health Office. Bandung City Health Profile in 2018.
11. Yuniarti, Rusmilawaty, Tunggal. T. Hubungan Antara Kepatuhan Minum Tablet Fe Dengan Kejadian Anemia Pada Remaja Putri Di Ma Darul Imad Kecamatan Tatah Makmur Kabupaten Banjar. *Jurnal Publikasi Kesehatan Masyarakat Indonesia*, Vol. 2No. 1, April 2015.
12. Dayer L, Heldenbrand S, Anderson P, Gubbins PO, Martin BC. Smartphone medication adherence apps: potential benefits to patients and providers. *Journal of the American Pharmacists Association*. 2013 Mar 1;53(2):172-81.
13. Sarli D, Gunawan I, Poddar S. Early screening of baby blues based on Android applications: First-week postpartum. *Enfermeriaclinica*. 2020 Jun 1;30:129-32.
14. Martini S, Saroh EN. Gambaran Tingkat Pengetahuan Ibu Hamil Tentang Tabu Makanan Pada Ibu Hamil Anemia. *Jurnal Kesehatan Ibu dan Anak Akademi Kebidanan An-Nur*. 2018;3(1).
15. Sulistiyanti A. Hubungan tingkat pengetahuan ibu hamil tentang anemia dengan kepatuhan konsumsi tablet Fe di wilayah kerja Puskesmas Masaran I Sragen. *Jurnal Maternity*. 2015;2(2).
16. Dewi RG. Pengaruh Kemampuan Ibu Hamil dalam Melakukan Deteksi Dini Resiko Preeklamsia Terhadap Paritas, Pengetahuan Dan Keterpaparan Informasi. *Medical Technology and Public Health Journal*. 2017 May 25;1(1).
17. Rosidi IY, Kadir A. Pengaruh Edukasi Konselor Laktasi Terhadap Partisipasi Ibu Melakukan Inisiasi Menyusui Dini. *Jurnal Ilmiah Kesehatan Diagnosis*. 2019 Feb 16;14(1):98-103.
18. Lestari DD. Pengaruh Pendidikan Kesehatan dan SMS Reminder Terhadap Kepatuhan Ibu Hamil dalam Mengkonsumsi Tablet Besi di Wilayah Kerja Puskesmas Pisangan.
19. Putri S, Wantonoro W. Hubungan Cara Konsumsi Tablet Fe dengan Kejadian Anemia Pada Ibu Hamil Trisemester II dan III di Puskesmas Tegalrejo Yogyakarta Tahun 2015 (Doctoral dissertation, STIKES'Aisyiah Yogyakarta).
20. Purwandari A, Lumy F, Polak F. Faktor-faktor yang berhubungan dengan kejadian anemia. *JIDAN (Jurnal Ilmiah Bidan)*. 2016;4(1):62-8.
21. Dewi DT, Kusumawati W, Ismarwati I. Effect of health promotion and Whatsapp reminder to self-efficacy of the consumption of Fe tablets adherence among pregnant women. *Journal of Health Technology Assessment in Midwifery*. 2019 May 30;2(1):23-32.