EFFECT OF IRON SUPPLEMENTATION DURING PREGNANCY ON NEONATAL DEATH IN INDONESIA (IDHS SECONDARY DATA ANALYSIS 2012)

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Abstract

One of the biggest nutrition problems for pregnant women is nutrition anemia which is the most common and widespread in the world (WHO, 2015). In Indonesia, 37.1% pregnant women suffer from this health problem. It is estimated that a half of anemia cases are caused by a deficiency of iron (WHO, 2014). Additional iron becomes one of the components of antenatal care which is expected to reduce neonatal mortality. Based on data SDKI 2012, only 33% of pregnant women who were provided by 90 iron tablets or more. The consequences of this deficiency include premature birth, complication, low birth weight, as well as neonatal mortality. The research was aimed to find out the influence of iron consumption during pregnancy on neonatal death in Indonesia in 2012. It used cross sectional design with a total sample of 13.917 neonatal who was born in 2007-2012 and 139 of them were neonatal mortality. This research found that there was a relationship between iron supplementation taken for 30-59 days during pregnancy with the incidence of neonatal death. Mothers who took iron for 30-59 days during pregnancy increased neonatal mortality by 2.56 times compared to mothers who consumed ≥ 120 days (95% CI = 1.12 to 5.81). The variables were mother's age when gave birth, occupation, type of birth, father's education, birth weight, antenatal care, and complications. The government should increase the standard of iron consumption during pregnancy at least for 90 days to reduce the anemia during pregnancy.

Keywords: Iron, Anemia, Nutrition, Pregnancy.

Presenting Author's Biography

Nanda Aula Rumana was born in Tegal on July 6th, 1988. She lives in Meruya Utara, West Jakarta. She obtained Bachelor degree from Universitas Indonesia, Faculty of Public Health in 2011. She took similar program in the same university for her Master degree and graduated in 2015. Currently, she is a lecturer in Faculty of Public Health in Universitas Esa Unggul with the subject of Biostatistics.

BACKGROUND

Infant Mortality Rate (IMR) is usually used as an indicator to determine the degree of health. According to the data of Indonesia Demographic and Health Survey in 2012, IMR in Indonesia was 32 death per 1,000 live births (LB). Based on data from Indonesia Statistics (*Badan Pusat Statistik/BPS*), 60% of infants' deaths are occured in the age of 1 month [1]. The period in the first 28 days is the most vulnerable time for the survival of children [2]. The death of baby aged 0-28 days age or commonly known as neonatal mortality occurred almost 40%.

Globally, neonatal mortality rate decreased from 33/1000 LB (4.7 million cases) in 1990 to 20/1000 LB (2.8 million cases) in 2013. However, the decline in neonatal mortality along the 1990 – 2013 is slower than the post-neonatal deaths [3]. IDHS indicates that in Indonesia neonatal mortality rate showed a declining trend. Although in 2012 and 2007 neonatal mortality rate still showed the same number which is 19/1000 LB, but in previous studies these numbers are at a higher performance namely 20/1000 LB (IDHS 2002-2003), 22/1000 LB (IDHS 1997), 30/1000 LB (IDHS 1994), and 32/1000 LB (IDHS 1991). However, the decline has not achieved the MDGs which the target is reducing the two-thirds of deaths between 1990 and 2015 [4].

The high number of neonatal mortality rate is caused by asphyxia (difficulty breathing at birth) and low birth weight (LBW) and infection [5]. Meanwhile, according to the WHO the highest causes of neonatal mortality were LBW and preterm. LBW and preterm should be the priority to prevent neonatal mortality. It is evidenced that babies who born with low/very low birth weight leading to infant death of 66/1000 LB. Neonatal mortality is closely related to the nutritional status of the mother. One among the nutritional problems experienced by pregnant women is anemia, especially nutritional anemia. It is caused by inadequate supplementation, especially protein and other blood-forming materials such as iron, folic acid, vitamin B12, and vitamin C [6]. Anemia prevalence in pregnant women, as reported by the International Nutritional Anemia Consultative Group on Guidelines for the Use of Iron Supplements to Prevent and Treat Iron Deficiency Anemia, showed a significantly high ratio of approximately 40%. Data of *Riset Kesehatan Dasar* (Riskesdas) in 2013 demonstrated the prevalence of anemia among pregnant women was 37.1% meaning that it closely became a serious health problem with a limit of ≥ 40% [7].

Antenatal care in Indonesia was launched through a program of the Ministry of Health by giving recommendation of qualified antenatal care such as the measurement of height and weight, blood pressure, iron tablets, tetanus toxoid immunization, abdominal examination, testing blood and urine samples, as well as information about the signs of pregnancy complications [8]. Additional iron for pregnant women becomes one of the components of antenatal care which is expected to reduce neonatal mortality. Data shows that only 33% of women who received iron tablets or iron syrup for 90 days or more (IDHS, 2012). The purpose of this study was to determine the effect of iron supplementation during pregnancy on the incidence of neonatal mortality in Indonesia during 2007- 2012.

METHODS

The data were obtained from Measure DHS (Demographic Health Survey) available at: http://www.dhsprogram.com/Data/. DHS program which is authorized to distribute the free data to legitimate academic research. Registration is required to access the data in the form of written consent and will be given limited access through a username and password provided by electronic mail by ICF International. Researchers were provided by raw instrument data according to the Demographic and Health Survey in 2012. However, the researchers only inquired a few questions pertaining to the title of the study.

This study was cross sectional design research. It used quantitative data obtained from IDHS 2012. The population in this study was all infants born by mothers in married status and aged 15-49 and gave birth in 2007 to 2012 in 33 provinces in Indonesia. Samples in this study were neonatal born in the period 2007-2012. Inclusion criteria for this study were married women aged 15-49 years, given birth during the period from 2007 to 2012, child born was the last child born, mother who had a child died at the age of 0-28 days or had children who are still alive at the age of 0-28 days to 5 years when the interview was conducted. While exclusion criteria were mothers without available information on the infant's date of birth and death.

The minimum samples were 366 respondents. Total respondents who fulfilled the criteria for exclusion and inclusion based on the data of Demographic and Health Survey 2012 was as many as 13,917 women. In this study, researcher used the whole neonatal born in the period 2007-2012 as the objects.

This study used three methods of data analysis. First, univariate analysis was conducted to know the distribution of the observed variables. Second, the bivariate analysis was conducted to reveal the degree of relationship between independent variable (iron supplementation) with dependent variable (neonatal deaths). In this study, Chi Square test and odds ratio (OR) were applied. OR is the estimated value of the risk of outcome because of the influence of the independent variables. Third, multivariate analysis using multiple logistic regression was used to reveal the relationship between the dependent variable (neonatal mortality) and independent variables (iron supplementation) by controlling the variable covariates including maternal factors (region of residence, education, age at birth, occupation, economic status, marital status, type of childbirth), paternal factors (education), neonatal factors (sex, birth order, birth weight), health service factors (pregnancy visits/ANC, complications, place of birth, birth attendants).

RESULTS

Table 1 shows the infants did not survive during their neonatal period were 139 neonates (0.84%), while the survive neonates were 13,778 (99.15%). The number of pregnant women who did not consume iron during the pregnancy was 3,775 respondents. As many as 3,102 respondents consumed iron for ≥ 120 days, followed by 1-29 days, 30-59 days, 60-89 days, respectively, 3,055; 2,102; and 954 respondents. Respondents who consumed iron supplement at least 90-119 days were 929. The number of respondents lived in rural areas were 7,525 (50.08%) and respondents' level of education (junior and senior) were 7,476 (54.14%). The maternal age at delivery of 20-35 years-old were 10,364 respondents (75.1%). Respondents with the status of working mother were 7,196 (51.01%). Distribution of economic status in this study was quite prevalent in quintile 1 (lowest) to 5 quintile (top) with the average of 20%. The number of respondents who divorced or her marital status on/off/separated in this study was very small, approximately 370 respondents (2.38%). There were 1,676 respondents (12.63%) gave birth with the method of Sectio Caesarea and 12,241 respondents (87.37%) gave birth in normal way. Education level in paternal or the father was not much different with maternal education/the mother that was dominated by the Secondary

Education (junior and senior) of 7,668 (54.78%). Based on the data, the neonatal death of male infants was higher than female infants, as many as 7,206 deaths (51.06%). In this research, the childbirth was dominated by the first birth of 4,849 (37.7%). In terms of maternal health service factors with complications during childbirth were 6,338 (48.52%). Many respondents delivered their babies at home amounted of 6,051 (34.71%) while with the assistance of health workers were 11339 respondents or 85.36%.

Table 2 is the result of analysis of the relationship between iron supplementation in pregnant women with neonatal mortality. The result was mother who consumed iron only 30-59 day could increase the mortality rate of 2.56 (95% CI = 1.14 to 5.73) compared to mother who consumed ≥ 120 days.

Table 3 shows the result of the multivariate analysis on the effect of iron supplementation on the incidence of neonatal mortality by entering a potential confounders and effect modifiers so that it was obtained by Hierarchically Well Formulated model or the most complete model. From the models, there was no interaction among variables so that obtained the gold standard model. Then test the confounder by eliminating one by one confounder starting with the highest p value. If there was change the value of the odds ratio> 10% after variable covariate excluded, then the variable was considered as confounding and must remain in the multivariate model. From the confounding test, there was a variable confounder that came out of the model so that obtained the most parsimonious or simple models contained in table 4. The table shows that there was relationship between iron supplementation which only 30-59 days during pregnancy with the incidence of neonatal mortality. Mothers who consumed iron only 30-59 days during pregnancy increased neonatal mortality by 2.56 times compared with women who consumed ≥ 120 days (95% CI = 1.12 to 5.81) after being controlled by the variable age at birth, occupation, childbirth type, father's education, birth weight, antenatal care, and complications.

Tabel 1. Distribution of The Character of Research Subject

Neonatal Mortality	**N**	**%**
Neonatal Mortality	139	0,84
Neonatal Life	13.778	99,15
Iron Suplementation	**N**	**%**
≥ 120 days	3102	26,92
90-119 days	929	8,26
60-89 days	954	7,68
30-59 days	2102	13,64
1-29 days	3055	18,82
0 day	3775	24,68
Living area		
Rural	7525	50,08
Urban	6392	49,92
Education		
Non-formal education	334	1,618
Elementary (SD)	4313	32,29
Junior and Senior High (SMP,SMA)	7476	54,14
Higher Education (College, University)	1794	11,95

Age			
□	< 20 years	1339	9,22
□	35 years	2214	15,68
□	20-35 years	10364	75,1
Occupation			
□	Work	7196	51,01
□	Unemployment	6721	48,99
Economic Status			
□	4: Kuintil 1 (lowest)	3953	20,23
□	3: Kuintil 2 (low middle)	2862	19,65
□	2: Kuintil 3 (middle)	2562	19,85
□	1: Kuintil 4 (up middle)	2434	21,33
□	0: Kuintil 5 (pest)	2106	18,93
Marital Status			
□	divorce death/life/split	370	2,38
□	marriage/life together	13547	97,62
Birth Delivery Type			
□	Sectio Caesarea	1676	12,63
□	Normal	12241	87,37
Father's Education			
□	Non-formal education	249	1,385
□	Elementary (SD)	4294	32,37
□	Junior and Senior High (SMP,SMA)	7668	54,78
□	Higher Education (College, University)	1706	11,46
Gender			
□	Male	7206	51,06
□	Female	6711	48,94
Birth Order			
□	The fourth or more	2400	14,13
□	The third	2445	16,12
□	The second	4223	32,05
□	The first	4849	37,7
Birth Weight			
□	Not Weighed	7,872	1768
□	< 2500 gram	6,24	842
□	≥ 2500 gram	85,89	11307
Complication			
□	Yes	6338	48,52
□	No	7579	51,48
Place of birth			
□	House	6051	34,71

	Health Facility	7866	65,29
Birth attendants			
	Health worker	2578	14,64
	Non- Health worker	11339	85,36
Total		**13917**	**100**

Table 2. Relation between Iron Suplementation and Neonatal Mortality in Indonesia on 2012

Variabel	Neonatal Mortality		Neonatal Life		Total	OR	P Value
	N	%	N	%	N	(95% CI)	
Iron Suplementation							
≥ 120 days	23	0,55	3079	99,45	3102	1	
90-119 days	10	1,11	919	98,89	929	2,03 (0,70 – 5,89)	0,188
60-89 days	6	0,32	948	99,68	954	0,58 (0,20 - 1,65)	0,31
30-59 days	28	1,39	2074	98,61	2102	2,56 (1,14 – 5,73)	0,021
1-29 days	25	0,7	3030	99,3	3055	1,28 (0,60 - 2,74)	0,518
0 days	47	1,08	3728	98,92	3775	1,99 (0,97 - 4,04)	0,057

Table 3. Gold Standar of the effect of iron suplementation during pregnancy on Neonatal Death in Indonesia on 2012

Variabel	OR	SE	P value	OR (95% CI)
Iron Suplementation				
• 0 days	1,28	0,47	0,505	0,61 - 2,65
• 1-29 days	0,99	0,4	0,983	0,44 - 2,18
• 30-59 days	2,5	1	0,022	1,14 - 5,48
• 60-89 days	0,58	0,32	0,335	0,19 - 1,74
• 90-119 days	2,15	1,18	0,164	0,73 - 6,33
• ≥ 120 days	1			
Maternal Factor				
Living area				
Rural	0,87	0,27	0,662	0,47 - 1,60
Urban	1			
Education				
Non-formal education	0,58	0,46	0,502	0,12 - 2,79
Elementary (SD)	1,52	0,77	0,411	0,55 - 4,15

□ Junior and Senior High (SMP,SMA)	1,06	0,48	0,892	0,43 - 2,60
□ Higher Education (Akademi, PT)	1			
Age				
□ < 20 years	2,39	0,94	0,026	1,10 - 5,17
□ 35 years	1,35	0,49	0,404	0,66 - 2,77
□ 20-35 years	1			
Occupation				
□ Work	2,93	0,78	0,001	1,73 - 4,94
□ Unemployment	1			
Economic Status				
□ 4: Kuintil 1 (lowest)	0,5	0,24	0,164	0,19 - 1,32
□ 3: Kuintil 2 (low midle)	0,54	0,25	0,19	0,22 - 1,34
□ 2: Kuintil 3 (midle)	0,89	0,37	0,782	0,39 - 2,03
□ 1: Kuintil 4 (up midle)	0,71	0,32	0,466	0,29 - 1,74
□ 0: Kuintil 5 (pest)	1			
Marital Status				
□ divorce death/life/split	0,88	0,44	0,81	0,32 - 2,39
□ marriage/life togather	1			
Birth Delivery Type				
□ Sectio Caesarea	2,33	0,86	0,021	1,13 - 4,82
□ Normal	1			
Paternal Factor				
Father's Education				
□ Non-formal education	1,39	1,32	0,725	0,21 - 8,94
□ Elementary (SD)	2,47	1,56	0,15	0,72 - 8,52
□ Junior and Senior High (SMP,SMA)	3,1	1,63	0,032	1,10 - 8,72
□ Higher Education (Akademi, PT)	1			
Factor Neonatal				
Gender				
□ Male	1,5	0,38	0,107	0,91 - 2,48
□ Female	1			
Birth Order				
□ The fourth or more	1,5	0,73	0,403	0,57 - 3,92
□ The third	1,13	0,44	0,736	0,53 - 2,43
□ The second	0,75	0,26	0,434	0,37 - 1,51
□ The first	1			
Birth Weight				
□ Not Weighed	9,13	3,8	0,001	4,03 - 20,68
□ < 2500 gram	14,66	4,58	0,001	7,93 - 27,08
□ ≥ 2500 gram	1			
Health Services Factor				
Antenatal Care/ANC	0,88	0,03	0,005	0,81 - 0,96
Complication				

□ Yes	2,28	0,67	0,005	1,28 - 4,06
□ No	1			
Place of birth				
□ House	1,26	0,42	0,494	0,64 - 2,46
□ Health Facility	1			
Birth attendants				
□ Health worker	0,55	0,22	0,148	0,25 - 1,22
□ Non- Health worker	1			

Keterangan: 1 sebagai kelompok pembanding

Tabel 4. Parsimoni Model Multivariate Analysis Effect of Iron Supplementation During Pregnancy on Neonatal Death in Indonesia

Variabel	OR	SE	P value	OR (95% CI)
Iron Suplementation				
• 0 days	1,31	0,51	0,48	0,61 - 2,82
• 1-29 days	1,05	0,44	0,894	0,46 - 2,39
• 30-59 days	2,56	1,07	0,025	1,12 - 5,81
• 60-89 days	0,58	0,31	0,317	0,19 - 1,68
• 90-119 days	2,13	1,16	0,164	0,73 - 6,21
• ≥ 120 days	1			
Maternal Factor				
Age				
□ < 20 years	2,13	0,81	0,046	1,01 - 4,50
□ > 35 years	1,76	0,52	0,055	0,98 - 3,15
□ 20-35 years	1			
Occupation				
□ Work	2,78	0,77	0,001	1,61 - 4,80
□ Unemployent	1			
Birth Delivery Type				
□ Sectio Caesarea	2,45	0,81	0,007	1,28 - 4,70
□ Normal	1			
Paternal Factor				
Father's Education				
□ Non-formal education	1,01	0,85	0,985	0,19 - 5,28
□ Elementary (SD)	2,46	1,26	0,079	0,90 - 6,75
□ Junior and Senior High (SMP,SMA)	3,07	1,36	0,011	1,28 - 7,35
□ Higher Education (Akademi, PT)	1			
Neonatal Factor				
Birth Weight				
□ Not Weighed	6,66	2,31	0,001	3,36 - 13,18
□ < 2500 gram	14,53	4,26	0,001	8,17 - 25,85

	≥ 2500 gram	1			
Health Services Factor					
Antenatal Care/ANC		0,89	0,03	0,006	0,82 - 0,96
Complication					
	Yes	2,27	0,65	0,005	1,29 - 4,01
	No	1			

DISCUSSION

The role of the secondary data in this study was very important because it was the depiction of the examined variables. By using secondary data, researchers cannot control optimally to the quality of the data. In addition, some of the variables were dropped out because of missing data, thereby reducing the number of samples of neonatal death. Nutritional factors such as BMI, anemia and obesity were not included in this study as iron supplementation is very closely related to nutritional factors. It was due to those variables were not included in the questionnaire IDHS 2012. Some variables did not describe the actual condition of neonatal death such as mother's education, father's education, occupation, marital status, and economic status. This is due to the data available in the IDHS 2012 was the condition at the time of the interview/survey. In addition, there was also a bias due to the differences in the iron supplement provided by the government and other institutions, thus, there was the possibility of bias because the interviewer was only exemplified by the government program.

Integrated antenatal care was qualified and comprehensive antenatal care was given to all pregnant women. Antenatal care aims to detect early abnormalities experienced by pregnant women. The Ministry of Health has recommended the components of qualified antenatal care as follows: (i) measurement of height and weight, (ii) measurement of blood pressure, (iii) iron supplements, (iv) a tetanus toxoid, (v) examination of the abdomen, (vi) testing of blood and urine samples, and (vii) information on the signs of pregnancy complications.

Antenatal care that was undertaken by pregnant women showed a positive trend towards iron supplementation. It was evidenced by the increase antenatal care quantity would likely increase the iron supplementation. Antenatal care in this study has shown a good result with an average of eight visits during the period of pregnancy. It confirmed the recommendation suggested by the government to conduct antenatal care at least 4 times. The need for nutritional counseling at each antenatal care about the benefits of iron supplementation during pregnancy and pregnant women with anemia to keep consuming iron to 4- 6 months after giving birth was required. Based on the explanation, the addition of iron to be one of the components of antenatal care which can reduce the neonatal death rate is crucial as only 33% women received iron tablets or iron syrup for 90 days or more (IDHS 2012).

Lack of iron supplementation was not only due to the low awareness among pregnant women to take iron, but also because of the uneven distribution of iron throughout Indonesia, especially in the remote and outer areas. In addition, it was figured out that taking iron might cause nausea effects so as to be replaced with ‘another iron’ with lower content of lower should be considered. In line with the results of research conducted by Thorand (1994)[9] in Jeneponto which reported the constraints of iron supplementation programs that directly limit the effectiveness is the level of distribution and compliance of women to consume iron. In those research, only 64% of women claimed to be facilitated by antenatal care. The percentage of women who claimed to have received iron was 45.8%.

In normal conditions, every human being has the need for iron. Iron is useful in every period of development because it can improve cognitive ability, survival, and increase working capacity. In pregnant women and her fetuses, iron can reduce the risk of LBW babies, perinatal death, maternal mortality and obstetric complications [10].

Iron deficiency can lead to decrease of work productivity due to the reduced of iron-containing enzymes and the decrease of blood hemoglobin. In addition, iron deficiency negatively affects brain function due to reduce of sensitivity of dopamine nerve receptors that can end up with the loss of these receptors. It will impair the concentration, memory and learning ability, increase pain threshold, the function of the thyroid gland and ability to regulate temperature decreases. Besides that, the condition of the body with iron deficiency causes white blood cells that destroy bacteria cannot work effectively. As a result will disrupt the immune system [11].

In pregnant women iron is required for the formation of the placenta and red blood cells, fetal development, hemodelucy process (blood thinning due to physiological changes during pregnancy). It is estimated that the need for iron during pregnancy is 1,040 mg. Of this amount, 200 mg of iron is used by the body during birth delivery and 840 mg of the rest of it is lost. 300 mg of iron transferred to the fetus in the form of 50-75 mg for the formation of the placenta, 45 mg to increase red blood cells and 200 mg vanished when birth delivery. This amount is two to three times than the needs of the normal people [12].

In general, foods supplemented by pregnant women are advised include six groups including; animal and vegetable protein, milk and dairy, breads and grains, fruits and vegetables rich in vitamin C, dark green vegetables, fruits and other vegetables. If all food ingredients are taken adequately, then all the nutrients needed for pregnant women can be fulfilled except for iron and folic acid. That is why supplementation of these two substances is still needed despite nutritional status of pregnant women has been on the position of pregnant women KMS green line [13].

The addition of iron through both foods intake and supplements proven to prevent a decrease in Hb. Without supplementation, iron reserves will be depleted during pregnancy. Therefore, pregnant women are encouraged to consume 30-60 mg of iron began in week 12 of pregnancy until 3 months postpartum were given every day. This was to avoid anemia caused by iron deficiency. As we know that basically anemia caused by various factors, but approximately half of the cases that occur due to iron deficiency [14]. Iron deficiency, especially those that cause anemia, became one of the most severe in the world today. During pregnancy, anemia can cause adverse effects for mother and baby such as hemorrhage, sepsis, maternal mortality, perinatal death and low birth weight, premature delivery, and complications [15].

According to WHO the causes of neonatal death in the largest are LBW and preterm (30%). Other studies have argued that 20% of neonatal deaths are caused by lack of iron supplementation [16]. Therefore, it can be said that the role of iron is quite significant in reducing neonatal death.

This research finds that Women who consume iron 30-59 days during pregnancy increases neonatal death by 2.56 times compared to mothers who consumed ≥ 120 days (95% CI = 1.12 to 5.81) after being controlled by the variable age at birth, occupation, type of birth, father's education, birth weight, antenatal care, and complications. In line with research conducted by Titaley that the risk of early neonatal deaths can be significantly decreased from infants whose mothers consumed iron and folic acid (HR 0.10; 95% CI = 0.01 to 0.67)

In fact this time iron supplementation in pregnant women in Indonesia is still low. In this study we found of 13 917 respondents, on average only consume 77 days of iron during pregnancy. It is still far from the government's recommendation to consume iron in at least 90 days with a dose of 60 mg of iron and 400 mcg folic acid 1x / day as soon as possible during pregnancy. The low supplementation iron in pregnant women in Indonesia resulted in the percentage of 37.1% of pregnant women with anemia [17].

Associated with the low rate of iron supplementation in pregnant women, INACG (International Nutritional Anemia Consultative Group) suggested to the region with a prevalence of <40% is recommended to consume 60 mg of iron and 400 mcg folic acid during pregnancy 6 months (180 days). If the duration of 6 months is not achieved, then it should be continued by taking iron during the 6-month postpartum period or increase a higher dose into 120mg during pregnancy.

Subsequently, the fact that the government recommended the consumption of 60 mg iron and 250 mcg folic acid for 90 days during pregnancy, then actually it is still below the standards released by INACG. Therefore, the government should increase the minimum standard of iron supplementation for more than 90 days during pregnancy with the expectation it will reduce the case of anemia during pregnancy.

CONCLUSIONS

The research revealed the average iron supplementation during pregnancy was 77 days (95% CI 72.89 to 80.25). In this condition, the rate of neonatal deaths was 139 deaths (0.84%) while neonatal survival was 13,778 live births (99.15%). Multivariate analysis result indicated the relationship between iron supplementation of 30-59 days during pregnancy with the incidence of neonatal death. Women who consumed iron for 30-59 days during pregnancy increased the possibility of neonatal death by 2.56 times in comparable with women who consumed the supplement for ≥ 120 days (95% CI = 1.12 to 5.81) after the analysis with the variables of maternal age, occupation, type of birth, father’s education background, birth weight, antenatal care, and complications.

SUGGESTIONS

Based on the study, it is required to promote the antenatal care program activities including:

1. To increase iron supplementation of at least 120 days to reduce the risk of babies born with low birth weight / prematurely.
2. To provide nutrition counseling at each antenatal care about the necessity of taking iron, containing foods rich in iron and vitamin C, things that interfere with the absorption of iron, pregnant women with anemia to keep drinking the substance iron to 4- 6 months after delivery.
3. To provide supplemental multivitamins, iron, and vitamin E as prescribed if LBW infants.
4. To improve antenatal care by empowering KIA book.

5. Supervisory program for pregnant women to take medication more regularly consume iron supplements.

The researchers needs to do further research by using better design study because of the slightly prevalence of neonatal death. The study design suitable for this study is a longitudinal study design since the respondents will participate from the beginning of the study. However, a longitudinal design requires substantial funds and is a long-termed study which might be difficult to carry out.

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