REVIEW ARTICLE

Factor Associated Anemia Among Pregnant Women: A Literature Review

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ABSTRACT

Every pregnant woman has a risk of anemia during pregnancy. The percentage of pregnant women with anemia is still high in the world. Anemia in pregnant women is influenced by various factors. The purpose of this research is to review various factors causing anemia during pregnancy. The research article databases were ProQuest, EBSCO, PubMed. The articles were chosen using the PRISMA approach, full text article criterion, open access, published within 2016-2021, articles which have DOI, experimental research design, case control, retrospective, cross sectional, prospective, by using keywords (anemia) AND (pregnancy) AND (etiology). The results obtained from three databases are 1.568 articles, and 14 articles met the criterion, and article quality was analyzed by using JBI instrument. The result showed the factors associated with anemia among pregnant women are social demographics, food taboo, family and husband support, lack of antenatal care visit, nutrition status including lack of micronutrients nutrition and macronutrients, and infection disease. Pregnant women are impacted due to anemia during pregnancy. Proper treatment is needed early on to minimize the risk of maternal morbidity and mortality in the future.

Keywords: Anemia, Factor associated, Pregnancy

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INTRODUCTION

Maternal health is the third main factor from 17 SDGs targets or known as Sustainable Development Goals, in which the third target is ensuring a life which supports prosperity for all ages, including pregnant women's healthiness. The number of maternal mortality becomes one of the problem points that has not been achieved. The target of maternal mortality in SDGs in 2030 will be 70 per 100,000 live births (6). Meanwhile, maternal mortality in Indonesia has not been reaching the SDGs target. The last data showed maternal mortality in Indonesia in 2019 was 305 per 100,000 live births. Those numbers are far from the target expected. Maternal mortality cannot be separated from various causal factors. Some maternal mortality causes are hypertension in pregnancy, infection, blood circulatory system disorder, metabolic disorder, and hemorrhage. Anemia is one of the risk factors for hemorrhage (25).

Anemia prevalence in pregnant women showed that 41.8% of pregnant women in the world have anemia, meanwhile in Indonesia it is as much as 37.1%, 36.4% pregnant women with anemia in the cities and 37.8% pregnant women with anemia in the villages (26). As many as 84.6% pregnant women with anemia in the age of 15-24 (40). The high prevalence will cause an impact on the health of pregnant women and fetuses. The impact resulted on mothers and babies due to anemia.

According to a research (46) conducted in Indonesia the result of anemia in mothers is chronic energy deficiency, bleeding when giving birth and maternal mortality. Meanwhile, the results of the babies are preterm birth, low body weight, child mortality, babies' growth and developmental disruption while in the uterus or after childbirth (26, 45). The impact caused by anemia in pregnant women has many harms and affects maternal and infant mortality rate in Indonesia, especially in the Covid-19 pandemic where very many people are limited to health access, and have decreasing financial income monthly. Those matters should be covered by medical practices to keep monitoring and giving knowledge for all pregnant women with anemia toward fulfilling nutrition from food and vitamins consumed by mothers during pregnancy. The impact resulted is related to causative factors. Therefore, the study aim was to review the factors of anemia among pregnant women.

METHOD

The study of the article used ProQuest, EBSCO, PubMed databases with the keywords (anemia) AND (pregnancy) AND (etiology). The study design of this literature review is quantitative and qualitative which discusses factors

which affect pregnancy anemia. The open access article criteria are full texts, having DOI, published in 2016-2021. The flow of article selection uses PRISMA, which is described in Figure 1.

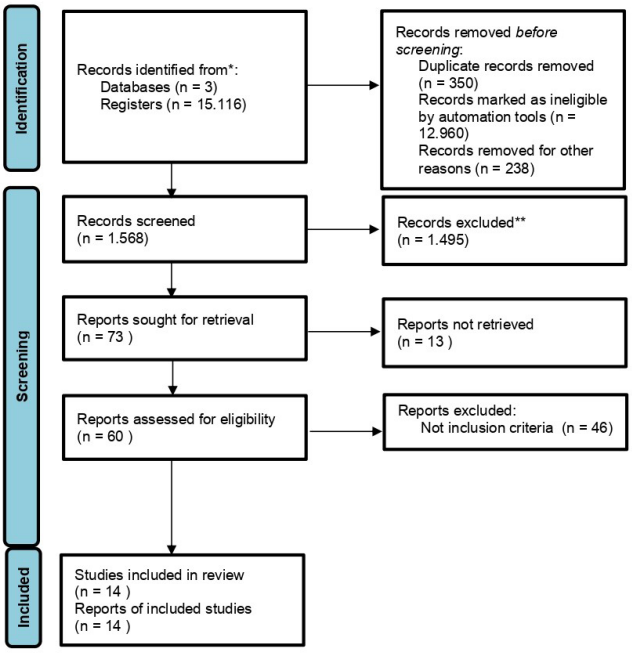

Figure 1: PRISMA flow diagram for the literature review process seelection of articles

Based on the article search results, 15,116 articles were found from three databases ProQuest, EBSCO, and PubMed. Furthermore, the articles were filtered according to 2016-2021, had DOI, full text and the articles were stored in the reference settings, namely Mendeley, to find out if there were duplications, resulting in a remaining 1,568 articles. After reading the title and abstract, 1,495 were eliminated because the title did not match the content; 13 articles were eliminated because there were irrelevant abstracts, and 46 articles were eliminated because they did not meet the inclusion criteria, namely the sample was not pregnant women with anemia in pregnancy. Then analysis was carried out on the remaining 14 articles with quantitative methods. Participants in the study came from Ethiopia (five articles), Africa (six articles), Indonesia (one article), Pakistan (one article), Wuhan (one article). Data collection in these studies was carried out by distributing questionnaires and observation methods.

RESULTS

The analysis of 14 articles found that respondents were pregnant women in the first trimester to the third trimester having risk of anemia. From 14 articles, we identified that factors affecting anemia among pregnant women were caused by demographic status (age, region, education, economic status) (33,50); health facility distance (5); food taboo such as not consuming protein, fiber, carbohydrate (32); family and husband support (28); lack of antenatal care visit; nutrition fulfillment status, which is lack of micronutrient nutrition such as vitamins and supplements and macronutrients such as carbohydrate, protein, fiber (11,15,32,34,1); infectious diseases including malaria, HIV, Covid-19, and worm infection (3,9,25,41).

DISCUSSION

Demographic Status

Demographic status includes mothers' age, education, income, and parity. The research done by (23) explained that pregnant women aged less than 20 are still in the developmental process in fulfilling their nutrition, meanwhile the nutrition of mothers is increasing during pregnancy. This makes them vulnerable to having anemia because, during pregnancy, mothers should share red blood cells with the fetus they are carrying. On the other hand, some researchers claimed that education is one of the efforts in reducing the number of maternal mortality, when educated mothers understand good information access and accept recommendations more from medics (16,21,41).

A family that has a minimum income prioritizes more on other needs than buying nutritious food. The research is on the same track with the research by (21) which explained that low income affects pregnant women's quality of life, where the availability of good food and health access is not the priority. Parity also can risk anemia happening. The research done by (3) claimed that there is a relation between parity and anemia cases in pregnant women. The research is on the same track with the research by (43) that claimed pregnancy frequency and childbirth cause iron back up in the mother's body to reduce; the higher the pregnancy frequency and childbirth the more the mother loses the amount of iron, so to return the iron back to normal it needs a number of pregnancies that are supported by proper nutritious food. According to (19), anemia in pregnancy is caused by hemodilution or blood dilution; therefore, physiologically, mothers with very many parity or childbirth records will increase blood plasma volume so it causes higher hemodilution.

Food Taboo

Pregnant women who follow culture or do food taboo can still be found in the world. The research result from (32) showed that pregnant women who do food taboo have higher risk of anemia than those who do not. Pregnant women in Ethiopia do a lot of food taboo, which means not consuming protein, vegetables, beans and fruits such as green pepper, meat, green vegetables, milk, bananas, eggs, beans, lettuce, spinach, broccoli, innards due to beliefs from ancestors (32).

Food taboo is sometimes practiced by pregnant women rather than mothers who are not pregnant, which will

Table I: Summary Article

Author	Purpose	Method	Findings
(Mohammed et al., 2019), Ethiopia (32)	The Aims to this study determine the determinants of dietary restrictions in anemic pregnant women in Ethiopian	Quantitative	Mothers who are obedient to the food taboo are 26.2% greater than pregnant women who are not compliant to the food taboo as much as 14.5%
(Ali et al., 2021), Pakistan (1)	The aim this study is to investigate the predictors of iron consumption for at least ≥90 days during pregnancy in Pakistan	Quantitative	Pregnant women who take 90 days of Fe tablets can reduce the risk of anemia
(Widiyanto & Lismawati, 2019), Indonesia (51)	The purpose of this study is to analyze the maternal age and anemiaare risk factors of low birthweight newborn.	Quantitative	Pregnant women with susceptible ages <20 and >35 years are more at risk of experiencing anemia during pregnancy
(Onyeneho et al., 2016), Nigeria (35)	The aims this study is to Factors associated with compliance to recommended micronutrients uptake for prevention of anemia during pregnancy in urban, peri-urban, and rural communities in Southeast Nigeria	Quantitative	Pregnant women who adhere to the intake of micronutrients are effective in preventing anemia during pregnancy
(Ssentongo et al., 2020), Sub Saharan Africa (42)	The aim this study to assess the association of malaria with anemia in pregnant women and to explore the joint effects of malaria and HIV infection on anemia in pregnant women aimed to assess the association of malaria with anemia in pregnant women and to explore the joint effects of malaria and HIV infection on anemia in pregnant women	Quantitative	Pregnant women who are infected with malaria, HIV are more prone to anemia compared to women who are not infected
(Bahizire et al., 2017), South Kivu (4)	The aims this study to malaria Is More Prevalent Than Iron Deficiency among Anemic Pregnant Women at the First Antenatal Visit in Rural South Kivu	Quantitative	Pregnant women who are infected with anemia are more likely to have malaria than mothers who are not infected with malaria
(Nasir et al., 2020), Ethiopia (34)	The aim of this study was to assess prevalence of anemia, rate of adherence to IFAS and associated factors among pregnant women at Tikur Anbessa Specialized Hospital (TASH), Ethiopia.	Quantitative	Pregnant women who do not comply with taking iron and folic acid tablets are more prone to anemia
(Kumera et al., 2018), Ethiopia (27)	The aim of this study was to assess the prevalence of anemia and associated factors among pregnant women attending antenatal care at Debre Markos Referral Hospital, Northwest Ethiopia.	Quantitative	There is a significant relationship between pregnant women infected with hookworms and the incidence of anemia with a value of [AOR = 2.65; 95% CI (1.48–4.72)].
(Begum et al., 2018), Niger (7)	Prevalence of and factors associated with antenatal care seeking and adherence to recommended iron-folic acid supplementation among pregnant women in Zinder, Niger	Quantitative	Pregnant women who routinely visit antenatal care accompanied by their husbands are more obedient in consuming iron tablets and folic acid
(Martin et al., 2017), Kenya and Ethiopia (30)	The aims of this study was to determine the husband's support for changes in the behavior of pregnant women in consuming iron and folic acid	Mix method	Husband's support is very significant in adherence to micronutrient intake during pregnancy
(Gibore et al., 2021), Tanzania (17)	The aims this study is to determine the prevalence of and assess the dietary habits associated with anemia in pregnant women receiving antenatal care (ANC) in Unguja Island, Tanzania	Quantitative	Pregnant women who limit food (diet) can have a higher potential for anemia than pregnant women who eat a variety of foods
(Delil et al., 2018), Ethiopia South (13)	The aim of this study was to Dietary Diversity and Its Association with Anemia among Pregnant Women Attending Public Health Facilities in South Ethiopia	Quantitative	Pregnant women who receive information and consume a variety of foods can prevent anemia during pregnancy
(Ouzennou et al., 2019), Morrocan (36)	The aims of this study to determine the relationship between anemia with demographic, socio-economic and cultural factors.	Quantitative	Pregnant women with low socioeconomic status have the potential to experience anemia
(Chen et al., 2020) (11)	The aims of this study to determine the condition of mothers and newborns who were confirmed to have Covid-19	Quantitative	Pregnant women who are confirmed to have Covid-19 are more likely to be anemic.

result in anemia (24,49). The food taboo is believed to avoid the difficulties when giving birth, avoiding gastritis, diarrhea and typhus, baby skin color change, and avoiding stomach cramps (18,39).

The Definition of Nutrition Fulfillment

a) Micronutrients supply

Micronutrients supply fulfillment is crucial to prevent and overcome anemia during pregnancy. The result of the research by (29) showed 52% (Hb 6,8 mg/dL) mothers with anemia in the first trimester, (Hb) 7,3 gr/dL) in the second trimester, and (Hb 8,1 gr/dL) in the third trimester, this is caused by pregnant women who disobey in consuming iron supplement. During pregnancy, mothers need more iron for their health, fetal growth, and childbirth process. One of the micronutrients important for mothers with anemia is iron supplement, which is important to form blood, fetal oxygen supply, and placenta during the second and third trimester. The

amount of iron needed by mothers during pregnancy is 835 mg (8). Daily iron fulfillment during pregnancy in Germany is 30 mg/day in second trimester, compared to women who are not pregnant which is only 16 mg/day (12).

Mothers who lack iron or are being disobedient in consuming iron supplements will risk giving birth with low baby weight, preterm birth, increasing gestational diabetes and anemia (31). The risk resulting from anemia in pregnant women requires various forms of prevention. Pregnant women should take iron supplement at least 90 days during pregnancy to prevent anemia and any other complication (9,17). Pregnant women who consume iron supplement will be educated to not consume phytic acid, oxalic acid, polyphenol and tannin, e.g. soybean is an ingredient of tofu and tempe, wrongly cooked spinach (heated more than 5 hours), tea, coffee (2,20). Not only consuming iron supplement, pregnant women who lack of iron micronutrients such as folic acid, vitamin A, B12, riboflavin, and zinc can increase risk having anemia because these micronutrients are important in hemoptysis (54).

b) Macronutrient Supply

Various kinds of food highly support pregnant women with or without anemia. Research done by (13) explained that pregnant women who are less consuming of various kinds of food will risk anemia happening. Pregnant women in Ethiopia consume oats more dominantly (96.5%), but consume less fish and meat (13).

Food options that are consumed daily must contain nutrients and with a proper portion for body needs; a proper food option defines mother and fetus health. Pregnant women with anemia mostly do not consume various kinds of food. Pregnant women at least should consume various kinds of food which contain carbohydrate, vegetable and animal protein, fiber, fruits, rice substitute, animal protein (chicken, meat, fish), vegetable protein (beans), vegetable, fruits (38). A research by (54) explained that pregnant women who consume eggs, innards, meat, fish, beans, and food containing vitamin A significantly minimize anemia during pregnancy. Furthermore, iron fulfillment in pregnant women is e not only gained from iron supplement, but also from various kinds of food and drinks (fruit juices) which contain iron (13).

Husband Support

Husband support plays an important role for healthiness and care of women during pregnancy. The result of a research by (7) explained that pregnant women that have a support from husbands are more eager for ANC (antenatal Care) visitation and obey consuming IFA (Iron Folic Acid). The research is on the same track with research by (50,53) where husband involvement affected pregnant women in being obedient to ANC visitation and in consuming vitamins recommended by medics. ANC visitation that involves husbands will be easier to detect mothers' anemia, fetal growth and any other obstacles (48). Pregnant women that have husband support will feel being loved and noticed, forming the aspect of taking medicines, food option, and ANC visitation, which can affect women's psychology to maintain the pregnancy to childbirth (30,33,37,47).

Antenatal Care

Antenatal care aims to identify abnormality and complications as early as possible during pregnancy, including anemia (52). ANC scope in Indonesia is 88,54, the scope has reached the strategic plan target in 2019 as much as 80% (25). A research by (22) stated that high quality ANC is a significant action to prevent anemia. There is need to improve the quality of health services and arrange a strategy for ANC visitation, such as involving pregnant women peer-groups, improving ANC visitation through electronic media, and health cadres empowerment (52).

Infection

Pregnant women's diseases also cause anemia to happen, such as infection diseases including malaria, HIV, worm infection, tuberculosis, and Covid-19. Pregnant women infected by worm infection have a 2.5 times higher risk of having anemia compared to those who are not. The explanation is because it can reduce appetite, malabsorption, and losing nutrition because of hookworms stuck on upper small intestines that will eat the blood, thus can cause bleeding in the digestive tract which will cause chronic anemia in pregnancy (28).

AS many as 60% of pregnant women with HIV and malaria are likely to have anemia (42). During pregnancy, HIV infection can reduce folic serum level and ferritin serum, which can cause anemia through cytokine production change, erythropoietin response change to bone marrow and antiretroviral medicine use (42). Pregnant women with anemia who suffer HIV are recommended to consume iron 60 mg/day and folic acid 400 mg/day, and suggested to be completed with various kinds of nutritious food. If nutritious foods are not adequate, they can be completed by other micronutrients supplies such as complex vitamin B, vitamin C, vitamin E, and selenium (15). Patients with tuberculosis are at risk of having anemia (10). Anemia in tuberculosis will increase blood loss from hemoptysis (blood in phlegm), decrease red blood cells production, and decrease appetite (10).

Furthermore, Covid-19 is also connected to anemia. Today, Indonesia is exposed to Covid-19, and previous study from (11) explained as many as 123 pregnant women diagnosed with Covid-19 having fetal movement, intrauterine fetal distress, KPD, preterm childbirth, and anemia (11,55). Covid-19 has risk factors of anemia to happen, because Covid-19 attacks patients' immune system thus patients feel limp, cough, fever, suffocated,

lack of appetite, and hypoxia (lack of oxygen). When a patient is having hypoxia it means oxygen distribution in the body is not fulfilled, and Covid-19 also contains protein that potentially attacks red blood cells and bin iron.

CONCLUSION

Factors affecting anemia in pregnant mothers include age, region, education, economic status, distance and health facility, food taboo such as not consuming protein, fiber, and carbohydrate, family and husband support, lack of antenatal care visit, nutrition status fulfillment including lack of micronutrient nutrition such as vitamins and supplement, macronutrients such as carbohydrate, protein, fiber, and infection disease like malaria. Medics play an important role in pregnant women's health, by sensitively understanding the habit of pregnant women concerning food taboo, because pregnant women are closely related to food taboo during pregnancy. Medics should conduct surveys and workshops related to anemia and education related to nutrition supplies during pregnancy, including what kind of food is not allowed to be consumed at the same time with supplement during pregnancy, and the bad impact that it will have. This education is not only for pregnant women, but also for husbands, families, and the surrounding community; as the result the community are able to understand how to maintain healthy pregnancy from the very beginning of pregnancy to childbirth.

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