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Anemia in pregnancy; the influence factors, responsibility and challenges of midwives

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ABSTRACT

Anemia is the largest public health case in the world, especially for women of reproductive age. Based on WHO data shows that anemia affects more than half a billion women of reproductive age globally, of which 38% are pregnant women. This article aims to analyze the anemia in pregnant women and related aspects, as well as the factors that influence it and the importance of knowing and implementing it. Based on cases of anemia in pregnancy in Indonesia, health workers, especially health workers, in carrying out health promotion, especially promotions for pregnant women, emphasize more on the changes that occur in pregnant women, especially the promotion of anemia in pregnant women and how to take iron tablets, one of which is by socializing the importance of consuming tablets. proper iron, eating foods that contain iron sources, and the importance of vitamin C to increase the absorption of iron tablets in the body.

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Introduction

One of the goals of national health development is to increase the ability and awareness of healthy living for everyone so that optimal public health can be realized, through the creation of the nation and state of Indonesia, which is characterized by its population living with healthy behavior and a healthy environment, having the ability to reach health services that are affordable. quality and can be obtained fairly and equitably for the realization of optimal health status. To support this goal, one of the main goals is to reduce maternal and infant mortality (Kemenkes, 2011; Tim, Luneto, & Kep, 2020).

The high MMR in Indonesia is caused by several factors, namely bleeding, eclampsia, abortion, prolonged labor, infection and Chronic Energy Deficiency (KEK) and anemia. Anemia is the result of a lack of micronutrients (vitamins and minerals) that cause symptoms such as weakness, tiredness, lethargy, dizziness, dizzy eyes and pale face. Anemia that often occurs is iron deficiency anemia, which attacks more than 600 million people (Handayani, Ikrawati, & Fitriani, 2019; Ode & Hadjirah, 2021).

The world health organization (WHO) defines anemia as a low blood hemoglobin concentration (Kassa, Arowojolu, Odukogbe, & Yalew, 2018; Kassa, Muche, Berhe, & Fekadu, 2017). WHO defines anemia in pregnant women as occurs when the hemoglobin (Hb) is less than 10.5 g/dL in the second trimester and less than 11 g/dL in the first and third trimesters. Anemia is one of the main health problems in society because it has various consequences. Anemia affects the physical health and cognitive development of individuals leading to low productivity and poor economic development of a country. This problem is also related to the

high rates of maternal and infant morbidity and mortality, especially in developing countries (Gupta & Gadipudi, 2018; Putry, Lapau, Abidin, Mitra, & Selvi, 2022).

WHO report shows that anemia affects more than half a billion women of reproductive age globally, of which 38% are pregnant women. Anemia is the most common complication associated with pregnancy, affecting nearly half of pregnant women globally. Usually occurs due to the normal physiological changes of pregnancy that result in a decrease in hemoglobin concentration. This problem is common in developing countries where there is an inadequate diet and poor prenatal vitamins and insufficient intake of iron and folic acid. (Berhe, Kassa, Fekadu, & Muche, 2018; Kassa, Arowojolu, Odukogbe, & Yalew, 2018)

The most common type of anemia is iron deficiency anemia which often affects women of reproductive age, especially pregnant women. Several studies have shown that anemia during pregnancy has several side effects that adversely affect the health of the mother and fetus. Obstetric problems that exist are generally caused by anemia such as abortion, prematurity, intrauterine fetal death, low birth weight and prenatal death. (Mariana, Wulandari, & Padila, 2018; Susiloningtyas, 2022).

Anemia in pregnant women is defined as a decrease in hemoglobin levels <11 g/dL during pregnancy in the I and III trimesters or less than 10.5 g/dL in the second trimester (Roosleyn, 2016). Anemia in pregnancy can have a negative effect, especially during pregnancy, childbirth and the puerperium. Anemia in pregnant women is associated with increased preterm birth, maternal and child mortality and infectious diseases. Iron deficiency anemia in pregnant women can affect the growth and development of the fetus or baby during pregnancy and after (Kemenkes, 2011). In addition, iron deficiency in pregnant women will have a negative impact on the growth of children's brain cells, so that it can consistently reduce children's intelligence (Aritonang, 2010; Sudargo, Kusmayanti, & Hidayati, 2018). This article aims to describe anemia in pregnant women and related aspects, as well as the factors that influence it and the importance of knowing and implementing.

Path physiology of Anemia in Pregnancy

WHO defines anemia for pregnant women as hemoglobin less than 10.5 g/dL (105 g/L) in the second trimester and less than 11 g/dL (110 g/L) in the first and third trimesters. Hemoglobin concentration decreases during the first trimester, reaches its lowest point in the second trimester, then begins to increase again in the third trimester (Khuu & Dika, 2017; Lima, Pereira, Castro, & Santos, 2022).

During pregnancy, the mother's body requires more iron than usual. The cause of this increased need for iron is (Georgieff, 2020):

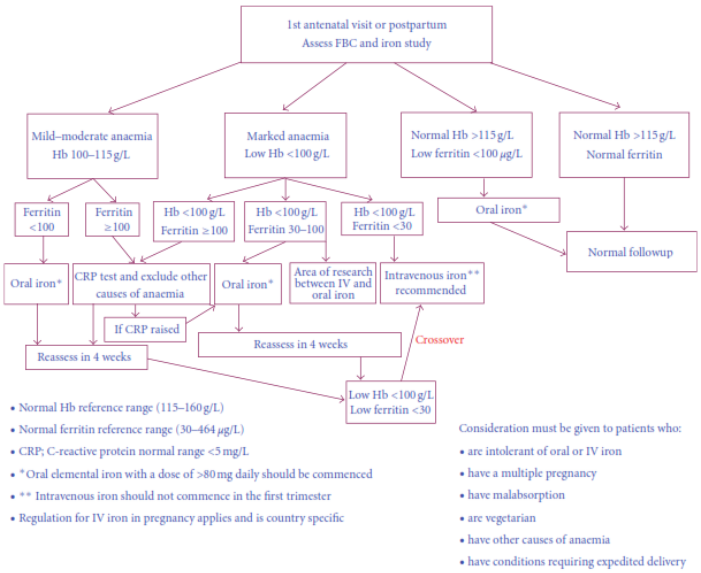
1. Maternal plasma and blood volume increase during pregnancy. Each extra gram of hemoglobin synthesis of the mother's body requires an additional 3.46 mg of iron,
2. The fetus needs iron for its own metabolic and oxygen delivery needs and its relatively large endogenous iron load will be used in the first 6 months after birth.
3. The placenta is a highly metabolically active organ with great iron requirements. The placenta has the capacity to store iron in the reticuloendothelial cells leading to a low supply.

During a singleton pregnancy, the maternal plasma volume increases by about 50% and is accompanied by a slight increase (about 25%) in the mass of red blood cells. These changes are responsible for producing the physiological anemia that occurs during pregnancy. The need for iron reaches its peak in the second and third trimesters to support the expansion of maternal blood volume and the development of the fetus and placenta (Ayoya, Spiekermann-Brouwer, Traoré, Stoltzfus, & Garza, 2006; Georgieff, 2020).

Physiological anemia or dilutional anemia in pregnancy is observed in healthy pregnant women as a result of a relatively greater expansion of plasma volume by 30-40% compared to an increase in Hb mass and erythrocyte volume by 20-25%. This causes a slight decrease in Hb levels, creating a low viscosity state, which improves oxygen transport to the placenta and fetus (Gupta & Gadipudi, 2018; Keepanasseril et al., 2022).

Pregnancy significantly increases the need for iron to balance the physiological needs of the increased hematocrit in the developing fetoplacental unit, and for losses during labor and lactation. The Institute of Medicine (IOM) estimates that the total iron loss associated with pregnancy and breastfeeding is approximately 1,000 mg and has recommended a daily dietary allowance for iron in pregnancy of 27 mg instead of the 8 mg required for the nonpregnant adult population. This recommended daily allowance of iron during pregnancy is not met, it causes women with depleted iron stores to experience Iron Defeciency Anemia (IDA) (Gupta & Gadipudi, 2018; Keepanasseril et al., 2022).

Recent research on iron metabolism in humans has paved the way for the discovery of a new peptide hormone, hepcidin, which acts as a homeostatic regulator of systemic iron concentration by controlling iron efflux into plasma. Hepcidin levels in pregnant women are generally lower than in healthy women who are not pregnant, and decrease as pregnancy progresses, the lowest hepcidin levels observed in the third trimester. With decreased hepcidin expression, there is an increase in dietary iron absorption and an increase in ferroportin-modulated iron mobilization from body stores. Inflammatory states, including pre-eclampsia, malaria infection, and obesity, have been associated with higher hepcidin during pregnancy compared with healthy controls, suggesting that maternal and fetal iron bioavailability may be compromised in these conditions. A pregnant woman weighing 55 kg is estimated to need about 1200 mg of additional iron during pregnancy. Daily iron requirements increase from about 0.8 mg in the first trimester to 4-5 mg during the second trimester and > 6 mg in the third trimester (Singh & Tewari, 2021).



Source: (Khalafallah & Dennis, 2012)

Figure 1 <Proposed Treatment for Anemia in Pregnancy and Postpartum Period Based on Deferent Randomized and Non-randomized Trials>

Screening or Examination of Iron Deficiency Anemia in Pregnancy

Screening or examination of anemia in pregnancy is carried out to detect the condition of anemia in pregnant women early so that it can be overcome and does not have a negative effect on the health of the mother and fetus. The method most often used in the laboratory and the simplest is the Sahli method or visual calorimetric method and is carried out in the Clinical Pathology laboratory. In this method, hemoglobin is converted into acid hematin using HCl solution, then the color that occurs is compared visually with the standard in the tool. Ferritin is a sensitive body iron stores, its levels decrease before anemia occurs. Ferritin was assessed using the VIDAS automatic quantitative test with the indicator (Faatih, 2017; Satria, Amir, & Vaulinne, 2019).

For the determination of hemoglobin levels are determined in various ways, namely (Joeliantina, Agil, Qomaruddin, Jonosewojo, & Kusnanto, 2016):

1. Sahli
   This sahli is widely used in Indonesia, although this method is not 100% accurate, it is still considered good enough to know if someone is lacking blood. The error in performing this check is approximately 10%.
2. Cyanmethemoglobin method (Drapkin's Cyanmeth Reagent Method)
   This method is very good for routine laboratories and is highly recommended for careful determination of hemoglobin levels because the cyanmethemoglobin standard it provides is stable and can be purchased.
3. The tallquist way
   This method only gets an impression of the hemoglobin level, as a basis for taking blood = 100% = 15.8 grams of hemoglobin per 100 ml of blood.

4. Sulfate way
   This method is used to determine the hemoglobin level from the donor required for blood transfusion

In pregnancy, blood tests are carried out at least twice during pregnancy, namely in the first trimester and third trimester. Considering that most pregnant women are anemic, 90 tablets of Fe preparations are given during pregnancy (Kemenkes RI, 2019).

Screening for anemia in pregnant women according to BHSI recommendations, namely: (Tran Khai & McCormack Suzanne, 2019) :

1. Anemia should be defined as hemoglobin (Hb) concentration <110 g/L in the first trimester and <105 g/l in the second and third trimesters and <100 g/L postpartum.
2. Hemoglobin concentration should be measured routinely at time of order and around 28 weeks of gestation (1D).
3. anemia with no other apparent cause is detected, oral iron diagnostic tests should be administered without delay, with a repeat complete blood count in 2-3 weeks.
4. The optimal diagnostic strategy for anemia in pregnancy is unknown but routine unselected screening with serum ferritin outside the context of the current study is not recommended.
5. Serum ferritin should be measured in women with known hemoglobinopathies to identify concurrent iron deficiency and exclude iron loading status.
6. Non-anemic women at risk for iron deficiency should be identified and started with empiric iron prophylaxis or have serum ferritin checked first..
7. Serum ferritin level <30 g/l in pregnancy is an indication of iron deficiency. Levels higher than this do not rule out iron deficiency.

Causes of Anemia in Pregnancy

Common Causes of Anemia

Anemia can be caused by several causes, such as micronutrient deficiencies (iron, folate, and vitamin B12), genetic disorders, or other conditions that can cause iron loss or decreased iron absorption, chronic kidney disease, neoplasms, and autoimmune diseases. Iron deficiency is a major factor causing anemia in developing countries. Approximately 50% of cases of anemia are caused by iron deficiency (Brito et al., 2020; Robalo Nunes et al., 2020). Based on the cause, anemia can be grouped into three categories, namely: (Brito et al., 2020):

1. Anemia due to the loss of red blood cells
   Anemia due to loss of red blood cells can be caused by bleeding. Bleeding that can cause the loss of red blood cells include injury, gastrointestinal bleeding, uterine bleeding, or bleeding due to surgery. Loss of blood in large amounts of course will cause a lack of blood in the body, resulting in anemia. Anemia due to large and short-term bleeding is rare. This situation usually occurs in accidents and the resulting danger. In adult males, most of the blood loss is caused by the bleeding process due to disease or trauma, or as a result of the treatment of a disease. While in women there is bleeding every month, where if the blood that comes out during menstruation is very large, iron deficiency anemia will occur.
2. Anemia due to decreased production of red blood cells
   Anemia due to decreased red blood cell production can be caused by a lack of red blood cell constituent elements (folic acid, vitamin B12, and iron), impaired bone marrow function, such as tumors, toxin treatment, and inadequate stimulation due to reduced erythropoietin, for example in kidney disease. chronic. The number of blood cells produced can decrease when there is damage to the bone marrow area or the basic materials for production are not available.
3. Anemia due to increased destruction of red blood cells
   Anemia due to increased destruction of red blood cells can occur due to the overactive Recitu Leondothelial System (RES). Increased destruction of red blood cells and inadequate production of red blood cells is usually caused by several factors, namely::
   a. The ability of the bone marrow to respond to a decrease in red blood cells is less due to an increase in the number of reticulocytes in the blood circulation
   b. Increased red blood cells that are still easily in the bone marrow compared to mature ones.
   c. he presence or absence of the results of destruction of red blood cells in the circulation (such as increased levels of bilirubin)

Normal blood cells produced by the bone marrow will circulate through the blood throughout the body. At the time of synthesis, excessive immature (young) blood cells can also be secreted into the blood. Young blood cells usually break easily, causing anemia

Other Causes of Anemia in Pregnancy

Anemia in pregnancy is caused by many interrelated factors. The causes of anemia in pregnancy are as follows: (RI, 2020).

1. Diets that are less diverse and nutritionally balanced. During pregnancy, the mother is recommended to consume foods that contain complete protein, carbohydrates and micronutrients (vitamins and minerals). Pregnant women are also highly recommended to consume foods rich in iron such as liver, fish, eggs, meat, tofu, Tempe, green vegetables and colored fruits. A poor diet in pregnant women will cause the mother to experience nutritional deficiencies, especially iron which can lead to several adverse conditions such as anemia (Ukybassova et al., 2019). As many as 90% of anemia in pregnancy is caused by inadequate iron intake. (Sleiman, El Baba, Garzon, & Khazaka, 2020)
2. Having an infection that causes the mother to lose iron, namely Paracitic infections such as amoebic dysentery, malaria, hookworms, hemoglobinopathies and schistosomiasis which can cause anemia (Laganà et al., 2019).
3. Repeated pregnancies in a short time (distance between pregnancies of less than 2 years). The close distance between pregnancies causes the mother's body to experience anemia because the mother's body does not have enough time to recover from the previous pregnancy.
4. Pregnant women experience Chronic Energy Deficiency (KEK) with Upper Arm Circumference (LILA) smaller than 23.5.

Effect of Anemia on Pregnancy

Anemia causes low physical ability because the body's cells do not get enough oxygen supply. In pregnant women, anemia increases the frequency of complications in pregnancy and childbirth. The risk of maternal death, the rate of prematurity, low birth weight and perinatal mortality increases. In addition, antepartum and postpartum hemorrhage are more common in anemic women and are more often fatal because anemic women cannot tolerate blood loss (Hidayah et al., 2021; Rahmawati, Nurmala, Berliani, & Aprilia, 2021). Impact of anemia In pregnancy, it varies from very mild complaints to the occurrence of aborted pregnancy, immature/premature parturition, disruption of the delivery process (bleeding), postpartum disorders (resistance to infection and stress, low milk production), and disorders of the fetus (abortion, dysmaturity), microsomy, congenital defects, low birth weight, perinatal death, etc.) (Fitzmaurice et al., 2017) The following are some of the effects of anemia in pregnant women, namely:

Impact on Mother

Placenta Previa

Pregnant women with anemia can cause impaired placental and fetal growth. This is caused by a decrease in Hb levels during pregnancy, i.e. blood volume 50% increases from 4 to 6 L, plasma volume increases slightly, causing a decrease in Hb concentration and hematocrit value (Putry, et al., 2022; Reni, 2019). This decrease will be smaller in pregnant women who consume iron. The increase in blood volume serves to meet the perfusion needs of the placenta and to provide backup for blood loss during childbirth. During pregnancy, the uterus, placenta and fetus require adequate blood flow to meet nutritional needs (Putry et al., 2022; Reni, 2019)

Premature rupture of membranes

Low hemoglobin levels allow pregnant women to easily get infections. Nutritional deficiencies can affect the body's response to infection and the strength of the collagen membrane, abnormalities in the structure of collagen and changes in the extracellular matrix. Anemia affects the strength of the body's response to infection and immune function which results in a decrease in the ability of natural killer cells. The mechanism of infection will disrupt the collagenolytic process resulting in a disturbance in the balance between the production of matrix metalloproteinases (MMP), which are enzymes produced by the extracellular matrix including collagen and those that inhibit the production of MMPs. The amniotic membrane will respond to inflammation so that it becomes thin and breaks easily (Reni, 2019)

Ritawati's research revealed that a low hemoglobin level of less than 11.1 g/dl during pregnancy was suspected as a cause without symptoms that led to infection and ultimately increased the incidence of PROM in premature pregnancy. Stating that anemia can cause hypoxia and iron deficiency so that it can increase serum norepinephrine concentrations which can induce stress in the mother and fetus. So that the synthesis of corticotropin releasing hormone. concentration (CRH) can increase the main risk factor for labor with premature rupture of membranes CRH also increase the production of fetal cortisol which can inhibit

longitudinal fetal growth point In addition, an alternative mechanism could be that iron deficiency increases oxidative damage to erythrocytes and the fetoplacental unit so that the amniotic membrane weakens. and premature rupture of membranes occurs (Reni, 2019)

Ante partum Bleeding

Lack of Hb in the blood results in a lack of oxygen being carried or transferred to body cells and vital organs, including the uterus. Antepartum haemorrhage increases in incidence in conditions where the endometrium is poor, such as endometrial atrophy or poor decidual vasculature (Reni, 2019).

Kordis Dekompensation

In cases of anemia, the heart has to work harder to supply oxygen-rich blood to the tissues and other organs of the body. This increases the work of the heart in pumping blood and can have a negative impact so that, if this condition is allowed to continue, it will result in an enlarged heart, fast or irregular heartbeat, and heart failure. Besides that, changes in heart function can also cause preload to increase, decrease peripheral vascular resistance and increase cardiac output, increased heart work can cause an increase in left ventricular mass and extra pressure on the heart wall. a condition called myocardial ischemia, which is a decrease in the blood supply to the heart muscle. All of these hemodynamic changes can lead to heart failure (Reni, 2019).

Chronic anemia can lead to the formation of new blood vessels when there is cardiomegaly. Researchers believe that chronic anemia can lead to the formation of new blood vessels in the restructuring of the heart and microcirculation due to decreased oxygen in the blood or increased coronary blood flow due to reduced blood viscosity. (Reni, 2019).

Postpartum Bleeding,

One of the predisposing factors for postpartum hemorrhage is anemia in pregnancy. There were 39 (30.5%) anemic pregnant women experiencing postpartum hemorrhage. Pregnant women with anemia have a 5 times greater chance of experiencing postpartum hemorrhage than those without anemia. This is in line with the results of the study which stated that the risk of pregnant women with anemia with the incidence of postpartum hemorrhage was 4.27 (Nyfløt, 2017).

Anemia can reduce the mother's immune system and increase the frequency of pregnancy and childbirth complications. Anemia also causes an increased risk of postpartum hemorrhage. Fatigue in patients with anemia is caused by energy metabolism by muscles not running perfectly due to lack of oxygen. This is in line with Wuryanti's research which states that the risk of postpartum hemorrhage in anemic mothers is 8 times greater than that of non-anemic mothers and is statistically related. (Sandhi, 2021).

The Impact of Anemia on the Fetus

BBLR

Babies born weighing less than 2500 grams have a greater risk of experiencing illness due to infectious diseases that have the potential to cause greater death compared to babies born with normal weight or with a minimum birth weight of 2500 grams. Nutrition is one of the factors that can cause LBW. Low consumption of micronutrients (B vitamins and iron) and weight gain during pregnancy have a very important contribution to fetal growth (Sandhi, 2021; Singh & Tewari, 2021).

Iron is a mineral for the formation of hemoglobin which plays a role in circulating energy and oxygen throughout the body's organs (Brannon, 2017). Decreased hemoglobin levels can cause changes in placental angiogenesis and limited oxygen delivery capabilities to the fetus with the consequence of intrauterine growth restriction (IUGR) and low birth weight (Gupta & Gadipudi, 2018; Hidayah, et al., 2021). conducted in Indonesia that there is a relationship between maternal Hb levels during pregnancy and the incidence of LBW with p0.045 (Lumbanraja, 2019).

Premature Birth

Premature births were more common in pregnant women with iron deficiency anemia than normal pregnant women ($p = 0.004$) (Stephen et al., 2018). The same results were also shown in another study that premature birth was associated with the incidence of untreated anemia in women during pregnancy ($p = 0.003$) (Pinho-Pompeu et al., 2017). Pregnant women with malnutrition and anemia also have the potential to experience premature labor. . However, the relationship between anemia in pregnant women and preterm labor is still unclear. The World Health Organization (WHO) estimates that 35-37% of pregnant women in developing countries and 18% of pregnant women in developed countries experience anemia. Klenoff also studied more than 27,000 women and found an increased risk of preterm delivery in mid-trimester anemia. This is associated with an increased risk of infection and chronic hypoxia which can induce stress on the mother and fetus. This stress response triggers the release of the hormone cortisol. Cortisol activates the maternal or fetal hypothalamic-pituitary-adrenal axis. Through the hypothalamic-pituitary-adrenal axis of the

fetus, more Corticotropin Releasing Hormone (CRH) will be formed. CRH plays a role in the general delivery pathway. The mechanism of CRH in triggering labor are: increasing prostaglandin E2 (PGE2), increasing prostaglandin 2α (PG2α), stimulation of adrenocorticotropin (ACTH), and inducing fetal adrenals to form DHEAS. All of these mechanisms will cause cervical effacement, contraction of the myometrium, which will induce premature labor (Robalo Nunes et al., 2020; Sleiman et al., 2020)

Neonatal Death

The incidence of anemia in pregnant women increases the risk of 1.64 times greater risk of giving birth to babies who experience perinatal death compared to pregnant women who are not anemic (a OR 1.64; 95% CI1.17-2.01; p 0.05) and the incidence of anemia in mothers pregnant women have a 1.75 times greater risk of giving birth to babies who experience still births than pregnant women who are not anemic (a OR 1.75; 95% CI 1.26-2.44; p0.055) (Khan, 2016; Reni, 2019) This is in accordance with research conducted by Ima Azizah in Grogoban Regency that there is a relationship between maternal anemia status and neonatal mortality, namely, anemic mothers have a 3.2 times risk of neonatal death compared to mothers who are not anemic (p = 0.013 (OR = 0.05). 3.2; 95% CI = 1.3-7.4) During pregnancy, the mother's body undergoes hematological changes in the form of blood plasma and red blood cells which increase in comparison to 30% blood plasma, 18% red blood cells, and Hb 19%. This is to meet the increased iron needs in childhood pregnant. The need for iron during 40 weeks of pregnancy is 750 mg which includes 425 mg for pregnant women, 300 mg for the fetus and 25 mg for the placenta. The hemodilution process will become pathological if nutrient intake is lacking and malabsorption. Inadequate nutritional intake and malabsorption will cause an imbalance so that it has an impact on a decrease in blood Hb (Khan, 2016; Lima, Pereira, Castro, & Santos, 2022)

Neonatal asphyxia

The state of the lack of hemoglobin in the blood in pregnancy occurs in a state of iron deficiency, folic acid, and bleeding due to hemorrhoids or bleeding from the digestive tract. Malnutrition in pregnancy causes inhibition of hemoglobin synthesis, so that the amount of hemoglobin cannot keep up with the increase in plasma volume. Anemia in pregnancy causes the transport of oxygen to the tissues and fetus is disturbed. This disorder can cause hypoxia in the fetus in the womb so that at the time of birth it can cause neonatal asphyxia (Khan, 2016). This is in accordance with the results of a study conducted by Subriah that there is a significant relationship between anemia and fisia neonatorum, the value of p = 0.000 (p <0.05), anemia in pregnancy causes obstacles in the formation of hemoglobin, so that the amount of hemoglobin cannot compensate for the increase in hemoglobin. plasma volume. Anemia in pregnancy causes impaired oxygen transport to the fetus. Disturbances can cause hypoxia in the fetus in the womb so that at the time of birth it can cause asphyxia neonatorum (Sandhi, 2021; Singh & Tewari, 2021).

Congenital Disability

Nutrition during pregnancy is one of the important factors in the formation of the fetus. A good diet will be sufficient to provide the nutrients needed for health during pregnancy and reduce the risk of birth defects. In addition, good food will help the body's defense system for pregnant women against infection. (Simbolon, et al, 2018). This is in accordance with research conducted which says that pregnant women who consume less foods containing iron during pregnancy or do not consume Fe tablets can result in anemia which has a negative impact on the mother and fetus (Aminin, 2016). intra-uterine fetal death, birth with anemia can occur congenital defects, the baby is susceptible to infection to perinatal death (Aminin, 2016; Putry et al., 2022).

Mental retardation

Pregnant women with iron deficiency anemia are at risk of causing mental developmental disorders in children aged 12 months by 5.8 (aOR5.8; 95% CI1.1–10.5) and children aged 18 months by 5.1 (aOR5, 1; 95% CI1,2–9.0) times greater than pregnant women who do not have iron deficiency anemia (Kassa, et al., 2017) Other studies also show the same results, pregnant women with iron deficiency are associated with low cognitive ability (Early Learning Composite) or gross motor function and pregnant women with low CBSF (cord blood serum ferritin) are also at risk of giving birth to babies with low cognitive abilities (Early Learning Composite or gross motor function) (Berhe, et al., 2018; Fitzmaurice, et al., 2017). The increased risk of cognitive mental development (CMD) is predicted to occur in early pregnancy by 7.13 times higher in pregnant women who suffer from anemia compared to those who do not (aOR7.13; 95% CI 3 ,13 – 11.13). The results of the stratification analysis based on iron intake also showed that there was a strong relationship between Pb levels in the blood in the final trimester of pregnancy and a decrease in the mental development index (MDI) of children aged 6 months (aOR-2.53; 95%CI -4.87 to - 0.19; P<0.04) (Brito et al., 2020; Faatih, 2017).

Signs and Symptoms of Iron Deficiency Anemia in Pregnant Women

It is generally agreed that the signs of anemia will be obvious if the hemoglobin (Hb) level is <7gr/dl. Symptoms of anemia can include dizziness, palpitations, lightheadedness, paleness, changes in nail epithelial tissue, neuromuscular system disorders, lethargy, weakness, fatigue, dysphagia, lack of appetite, decreased body fitness, impaired wound healing, and enlarged spleen. Meanwhile, based on the level of anemia, the signs and symptoms of anemia are: (Amalia, 2016):

1. Mild anemia: fatigue, decreased energy, weakness, shortness of breath, lightheadedness, palpitations, looks pale.
2. Moderate anemia: lethargic, pale, pale lips and nails, easily drowsy, tired quickly, dizzy eyes.
3. Severe anemia: changes in stool color, fast heart rate, fast blood pressure, rapid breathing rate, pale or cold skin, chest pain, dizziness or lightheadedness, shortness of breath, can't concentrate, fainting

Diagnosis of Anemia in Pregnant Women

1. History To establish a diagnosis of anemia of pregnancy can be done by taking a history, the history will get complaints of fatigue, drowsiness, dizziness, headache and dizzy eyes.
2. Physical Examination Physical examination revealed signs including pallor, jaundice, arthrostatic hypotension, peripheral edema, pale mucous membranes and nail beds, splenomegaly, tachycardia, tachypnea and dyspnea on exertion..
3. Laboratory Examination Hemoglobin examination is carried out at least twice during pregnancy, namely in the first trimester and third trimester with the consideration that most pregnant women experience anemia in that trimester, then 90 tablets of blood supplemented preparations are given to pregnant women at the Puskesmas. Hemoglobin examination can be carried out using several methods such as visual methods, gasometric methods, spectrophotometric methods and automatic hemoglobinometry (Tran, 2019; Yusuf, 2016).

How to Prevent Anemia in Pregnancy

Anemia can be prevented by eating a nutritionally balanced diet with adequate iron intake to meet the body's needs. Iron can be obtained by consuming meat (especially red meat) such as beef and also animal foods (liver, fish, and eggs). Iron can also be found in dark green vegetables such as spinach and kale, beans, peas, and beans. In addition, balanced with a healthy diet by consuming vitamins and iron supplements for maximum results. And avoid foods that contain tannins that will reduce iron absorption such as tea (Hidayah, et al., 2021; Kassa, et al., 2018). Pregnant women need to check hemoglobin levels at the first visit of pregnancy. Based on the Indonesian Health Profile for the prevention of anemia in pregnant women, every pregnant woman is expected to get a blood-supplementing tablet (TTD) of at least 90 tablets during pregnancy. (Kemenkes RI, 2019). Prevention of iron deficiency anemia can be done with 4 approaches, namely::

1. Giving tablets or injections of iron
2. Education and efforts related to increasing iron intake through food
3. Surveillance of infectious diseases
4. Fortify staple foods with iron

Prevention for anemia can also be done in the following ways, namely:

1. Get enough rest.
2. Eat foods that are nutritious and contain lots of Fe, such as papaya leaves, kale, beef, chicken liver, and milk.
3. Pregnant women regularly check their pregnancy at least four times during pregnancy to get iron (Fe) and other vitamins from health workers, as well as eat nutritious foods three times a day (3x1), with 2 times more servings (Robalo Nunes et al., 2020).

Handling and Management of Anemia in Pregnancy

The following is the handling of anemia in pregnancy according to the level of service: (Reni, 2019) :

Village Maternity Hut (VMC)

Anemia in pregnant women should ideally be detected and treated since the basic health service points in the village, pregnant women need to visit the VMC (Village maternity clinic) VMC to find out the condition of their pregnancy and find out if pregnant women have anemia, handling anemia at the VMC includes (Reni, 2019): Making a clinical diagnosis and referral laboratory examination to a more complete level of service.

Provide oral therapy to pregnant women in the form of 90 mg/day iron tablets. Nutrition education for pregnant and lactating mothers.

Community Health centers

The authority of the CHC to handle cases of anemia in pregnant women includes: Making a diagnosis and therapy, Determining chronic diseases (malaria, TBC) and their treatment (Reni, 2019)

Hospitals

The hospital is an advanced level of health service if the VMC s and health centers cannot handle cases of anemia in pregnant women. The hospital's authority in handling cases of anemia in pregnant women includes (Reni, 2019):

1. Make a diagnosis and therapy
2. Diagnosis of thalassemia and Hb electrophoresis, if the mother turns out to be a carrier, it is necessaryto test the husband to determine the risk to the baby

In addition, the handling of anemia based on the level is also divided into three parts, namely (Yusuf, 2016):

Mild Anemia

With a hemoglobin level of 9-10 g%, it is still considered mild, so it is only necessary to give a combination of 60 mg/day of iron and 400 mg of folic acid orally once a day. Give parenterally if the patient cannot tolerate oral iron. /iv. Given a total dose of 100 mg ferum destran 1000-2000 mg intravenously (Yusuf, 2016): The treatment is a combination of 120 mg iron and 500 mg folic acid orally once a day. Vitamin C helps iron absorption to be more efficient, mothers are recommended to (Yusuf, 2016):

1. 1. Take iron tablets and eat fruit rich in vitamin C.
2. 2. Eat green vegetables every day.
3. 3. Avoid drinking tea and coffee. If the mother does not get enough vitamin C, give 50 mg vitamin C tablets per day.

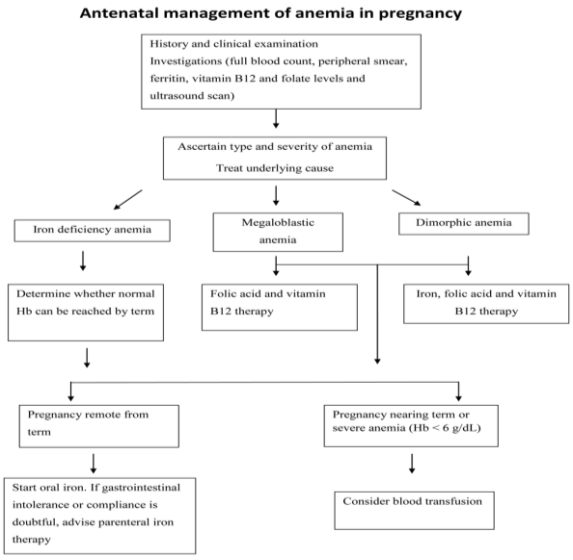
Severe Anemia

Administration of parenteral preparations is with ferro dextrin as much as 1000 mg (20 ml) intravenously or 2x10 ml intramuscularly. Blood transfusions for advanced pregnancy can be given even though they are very rarely given even though they are very rarely given considering the risk of transfusion for the mother and fetus (Yusuf, 2016): Treatment of deficiency anemia is with oral or parenteral iron preparations. Oral therapy is the administration of iron preparations: ferrous sulfate, ferrous gluconate or Na-ferrous biscitrate. Administration of 60 mg/day preparations can increase Hb levels by 1 g%/month. Side effects on the gastrointestinal tract are relatively small when given Na-fero biscitrate preparations compared to ferrosulfate. The current government program for every pregnant woman to get 90 tablets of iron tablets during her pregnancy. The iron tablets given contain 320 mg FeSO4 (60 mg iron) and 0.25 mg folic acid. Each month 30 tablets are given. This amount is sufficient for additional iron during pregnancy, which is 1000 mg (Ministry of Health, 2016). Administration of parenteral preparations, namely with ferum dextran as much as 1000 mg (20 ml) intravenously or 2x10 ml/im on the gluteus, can increase Hb relatively quickly, namely 2g%. Parenteral administration has indications: iron intolerance in the gastrointestinal tract, severe anemia, and poor compliance. The main effect is an allergic reaction, to find out, a dose of 0.5 cc/im can be given and if there is no reaction, the entire dose can be given (Khasanah, 2018; Reni, 2019).

Based on the BHS 2019 recommendations, the handling of anemia in pregnant women is as follows (Tran, 2019) It is recommended that the consumption of blood-added tablets is 40-80 mg every morning, check the Hb concentration for 2-3 weeks from the first consumption to ensure the success or failure of the added tablet. blood raises the Hb of pregnant women. Controlling the Hb level of pregnant women before and after consuming Fe tablets is very necessary to determine what actions will be taken next so that the progress of therapy is monitored and anemia can be handled properly. Treatment of anemia should be started as early as possible by the health professional who treats the woman. Examination of Hb levels should be carried out in TM one so that treatment or oral iron supplementation therapy can be carried out as early as possible. Specialist medical care is required in the following situations:

a) Pregnant women have severe anemia (Hb <70 g/l). b) Associated with significant symptoms of advanced gestational age (>34 weeks). 3) There is no improvement in maternal Hb values after 2-3 weeks of oral administration of blood-added tablets. 4) In non-anemic women at increased risk of iron depletion, 40-80 mg of elemental iron once daily should be offered empirically, or serum ferritin should be checked and iron

offered if ferritin <30 g/l. 5) Repeat Hb testing is required 2-3 weeks after starting treatment for pre-existing anemia, to assess adherence, correct administration, and response to treatment. 6) Once the Hb is in the normal range, the consumption of additional blood tablets should be continued for 3 months and for at least 6 weeks postpartum to replenish iron stores. 7) IV iron supplementation should be considered from the second trimester onwards for women with confirmed iron deficiency anemia who are intolerant of, or not responding to, oral iron. 8) IV iron supplementation should be considered in women presenting after 34 weeks of gestation with confirmed iron deficiency anemia and Hb < 100 g/l (1C).



Source : Stoltzfus R dan Dreyfuss *M*

Figure 2 < Anemia Treatment Scheme in Pregnancy>

Conclusions

Anemia is one of the problems that often occurs in pregnant women, especially in developing countries such as Indonesia. Anemia in pregnancy, if not detected and treated early, can reduce the quality of the health of the mother and fetus during pregnancy, childbirth, postpartum, and can even affect the condition of the baby being born. As a medical staff, especially midwives, they must be able to form a good management so that health problems in patients, especially pregnant women, can be handled properly. Thus creating comfort and providing well-being for patients or clients.

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