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DAFTAR ISI

Group 1st of Non-pharmacological Therapy that Most Effective to Increase Hemoglobin in Pregnancy

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ABSTRACT

***Background**: Anemia of pregnancy is still a global problem. The prevalence rate of anemia in pregnancy in developed countries at 14% and in developing countries at 51%, in Asian countries at 33.3%, Brunei Darussalam at 28.0%, Thailand at 30%, the Philippines at 32.3%, Malaysia at 26.6%, Singapore at 28.5%, and Vietnam at 23.5%. The prevalence of anemia in pregnant women in Indonesia in the 1st trimester at 3.8%, the 2nd trimester at 13.6% and the 3rd trimester at 24.8% Indonesian women die every year due to pregnancy and childbirth, while in East Java at 40%. The cause of anemia during pregnancy is nutritional deficiencies, especially lack of iron, folate, and vitamins. Purpose: to determine the level of effectiveness of non pharmacology therapy to increase hemoglobin in pregnancy. **Methods**: Systematic review using PRISMA and PICO methods. The population of this study is all international journals and accredited national journals sinta 1-6 totaling 87 articles. The sample is 23 articles that are appropriate with the inclusion criteria. The data collection is conducted by searching research articles in the database which including Google, GoogleScholar, Research Gate, NCBI, Science Direct, SAGE, Elsevier, and Sinta. Analysis is use thematic analysis. **Results**: The 1st group of non pharmacology therapy can increase hemoglobin levels, namely yellow pumpkin seeds, papaya fruit, papaya leaf juice, an avocado juice, red spinach juice, sweet potato leaf decoction, red guava, roselle tea, fried catfish, green bean juice, boiled chicken eggs, soy milk, honey, 2nd group, namely moringa leaf extract, chickpeas, dates, Dutch eggplant juice, ambon bananas, 3rd group, namely katuk leaf, beets, acupuncture points SP3, LR3, KI3, red seaweed, red dragon fruit. **The conclusion**: The most effective non pharmacology therapy for increasing hemoglobin in pregnancy is non pharmacology therapy in 1st group.*

***Keyword**: Hemoglobin, Non pharmacology Therapy, Pregnancy*

INTRODUCTION

The 3rd goal of sustainable development goals guarantees a healthy life and promote well-being for everyone in all ages. The target set by Indonesia is to reduce the Neonatal Mortality Rate to 12 per 1,000 live births, one of which is through the prevention of anemia in pregnant women (Brodjonegoro, 2017).

Anemia is a condition of the number of red blood cells less than the physiological requirement of the body and is referred to as "*potensial dancer to mother and child*". Therefore, anemia requires serious attention from all relevant parties (Desi Maria and Devi, 2019). Hb level is a measure of respiratory pigment in red blood granules, the amount of Hb is about 15 grams per 100 ml of blood (Lathifah and Susilawati, 2019).

Anemia case in developed countries have a prevalence of 14% and developing countries by 51%. According to World Health Organization (WHO) that the prevalence of anemia in pregnancy is higher, which is 41.6% (RH *et al.*, 2017). The case of anemia in pregnancy in Asian countries namely Myanmar (33.3%), Thailand (30%), Malaysia (26.6%), Philippines (32.3%), Brunei Darussalam (28.0%), Vietnam (23.5%), Singapore (28.5%) (Dondi and Putri, 2019). Cases of pregnancy anemia in Indonesia was 3.8% in the 1st trimester, 13.6% in the 2nd

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trimester, 24.8% in the 3rd trimester (Safitri, 2019); in East Java by 40%, Gempol District there are 227 pregnant women and 96 mothers with anemia (PWS KIA Pasuruan District Health Office) (Susiyanti and Virgia, 2022).

The cause of pregnancy anemia that often occurs in developing countries is nutritional deficiencies, especially lack of iron minerals, folate, and vitamins, vitamin A deficiency. It can also cause anemia (Hidayati and Roviatun, 2021). The impact is a growth disorder in body cells and brain cells, resulting in a lack of oxygen transferred to body cells and to the brain during pregnancy, childbirth, puerperium, ante partum bleeding (APB), postpartum haemorragia (PPH) (Handayani and Sugiarsih, 2020). Iron deficiency can also reduce immunity, decreased productivity, easy infection, postpartum bleeding, premature childbirth and infection during or after childbirth (Mustikasari and Effendy, 2022). The impact on babies includes intrauterine growth retardation (IUGR), low birth weight (LBW), and easily exposed infection (Pratiwi, 2021).

Preventive measures for anemia in pregnancy can be done pharmacology and non pharmacology. Pharmacology therapy is known to have many side effects, while non-pharmacological therapy is known to have relatively small side effects and almost no side effects. They are acupressure, acupuncture, giving fruits or in the form of fruit juice such as spinach juice, papaya, moringa leaves, green bean juice, katuk leaf tea, dates, ambon bananas, tomatoes, giving side dishes such as anchovies, chicken eggs and catfish (Utami, 2019), (Ningrum and Setiawandari, 2022); (Febriyanti, Nurfa'ida and Syaifudin, 2022); (Jannah and Puspaningtyas, 2018).

The purpose was to determine the level of effectiveness of non pharmacology therapies to increase hemoglobin levels in pregnancy.

METHODS

The design of this study is a systematic review. The population of this study is all international journals and national journals indexed by Sinta that examine non pharmacology therapies to increase hemoglobin levels in pregnancy with a limit of 2015-2022 totaling 63 articles. Sampling is use purposive sampling. The sample of this study is some reputable international journal articles and accredited national journals sinta 1-6 a total of 23 articles. Inclusion criteria are full text English articles that related to non pharmacology therapy to increase hemoglobin levels of pregnant women and full text proceedings that have been published and at least have E-ISSN. Exclusion criteria are articles that only abstracts; articles not published in reputable international journals/ national journals that accredited by Sinta 1-6. Data collection techniques at the preparation stage are access the informational needed. Additionnally, researchers look for journals or research articles in the English Database, including Google, GoogleScholar, Research Gate, NCBI, Science Direct, SAGE, Elsivier, Sinta with search keywords, namely the effectiveness of non pharmacology methods (spinach, tomatoes, decoction of yellow pumpkin seeds, papaya leaves, moringa leaf, green bean juice, katuk leaf, guava juice, rosella leaves, dates, chicken eggs, long bean stew, honey, ambon bananas, anchovy nugets, fried catfish cakes, acupressure, and acupuncture) with hemoglobin levels, pregnant women, and check the quality of Journals. For international journal is checked through Scimago JR and for national journal which it is checked by Sinta portal and use the PICO technique. The data collection techniques in the implementation stage is an article that have been collected are read and checked for suitability with the research topic and research objectives and reduced by PRISMA techniques and analysis using thematic, then interpreted. This research has been conducted an ethical approval at PGRI Adi Buana University Surabaya with number: 046-KEPK.

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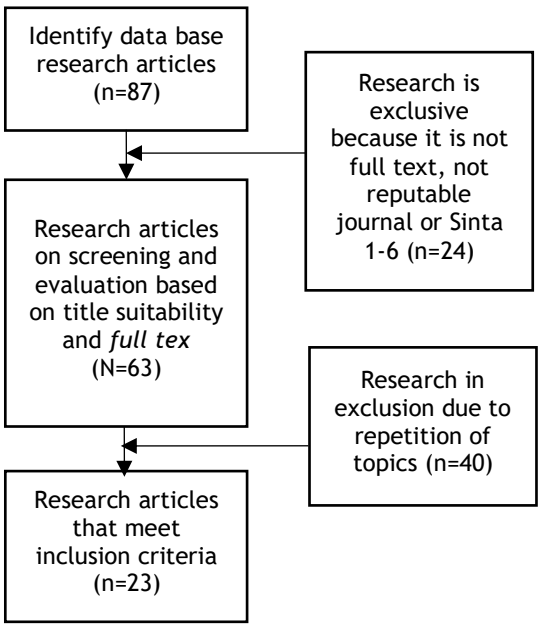

Figure 1. PRISMA Flow Diagram

RESULTS AND DISCUSSION

The results of a systematic review of the effectiveness of non pharmacology therapy to increase hemoglobin (Hb) levels in pregnancy shows that have 23 non pharmacology therapy that can increase hemoglobin levels of pregnant

Research conducted in 2016 showed women grouped into 3 groups ranging from the most effective (the p value between 0.000-0.001), effective (the p value between 0.002-0.01) and quite effective (the p value between 0.02-0.04). Non pharmacology therapy is an option in an effort to increase hemoglobin levels in pregnant women are the most effective and include 1st group , namely yellow pumpkin seeds, papaya fruit, papaya leaf juice, an avocado juice, red spinach juice, sweet potato leaf decoction, red guava, roselle tea, fried catfish, green bean juice, boiled chicken eggs, soy milk, honey.

Non pharmacology therapy in 2nd group includes moringa leaf extract, chickpeas, dates, Dutch eggplant juice, ambon banana; while non pharmacology therapy in 3rd group is katuk leaf, beets, acupuncture points SP3, LR3, KI3, red seaweed, red dragon fruit.

Non pharmacology Therapy in 1st Group as an Effort to Increase Hemoglobin Levels of Pregnant Women

Non pharmacology therapy in 1st group is very effective and most rapidly increases Hb levels of pregnant women.

Anemia is one of the most common disorders in pregnancy, including Fe deficiency, acute bleeding, which is often related to each other. Anemia in pregnancy is a condition of hemoglobin levels at <11g/dL in the 1st and 3rd trimesters, and <10.5g/dL in the 2nd trimester. Hemoglobin is a red pigment oxygen-rich protein rich in erythrocytes.

Hb levels in pregnant women can decrease due to the hemodilution process. Hemodilution in pregnancy is an increase in the volume of plasma in the blood. The hemodilution occures from the second trimester until the end trimester (32-36 weeks) will reduce Hb levels. Therefore, pregnant women need to consume Fe tablets and non pharmacology therapy that help increase Hb levels. The function of iron is form the placenta and red blood cells by 200-300%. Red blood cells are needed to carry more oxygen to the fetus. Meanwhile, during childbirth, an additional 300-350 mg of Fe is needed due to blood loss (Simatupang, 2021).

The need for Fe (iron) during pregnancy is average 800 mg namely 300 mg needed for the fetus, and the placenta; and 500 mg that use to increase the mother's hemoglobin. So, the more often a woman has pregnancy and childbirth, the more iron will be lost.

Efforts to prevent of anemia in pregnant women are routine hemoglobin level checks at least 2 times, namely in the first trimester and the third trimester, give Fe tablets to mothers, namely 90 tablets during pregnancy (equivalent to 800 mg Fe) as one of the strategies to participate in the success of government programs in overcoming pregnancy anemia, as well as efforts that should have low side effects and even no side effects. One of them is the provision of non pharmacology therapy through the support of adequate and adequate nutritional status of pregnant women will be able to give birth to healthy babies, have good growth and appropriate development and reduce the risk of morbidity in infants. In general, nutritional interventions for pregnant women can be provided supplementation, namely Fe, folic acid,

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Magnesium, Vitamin D, and zinc (Zn) which have an impact on pregnancy outcomes.

Non pharmacology therapy in 1st group at 1st order (very effective) in the form of yellow pumpkin seed biscuits can increase of hemoglobin, ferritin, CRP levels, reduce low birth weight (LBW) incidence, and stunting in the toddler. Yellow pumpkin seeds are a good source of phytoestrogens and exert estrogenic. The composition of the nutritional value of yellow pumpkin seeds per 100 gram includes carbohydrates 10.71 gram, energy 559 kcal, protein 30.23 gram, total fat 49.05 gram, cholesterol 0 mg, fiber 6 gram, folic acid 58 ug, niacin 4.8 mg, iron 8.8 mg, vitamin A 16 IU, thiamin 0.272 mg, vitamin B2 0.15 mg, vitamin B5 0.75 mg, vitamin B6 0.14 mg, vitamin C 0.272 mg, vitamin E 35.1 mg, sodium minerals 7.0 mg, potassium 809.0 mg, phosphorus 1232 mg, cobalt minerals 1.43 mg, magnesium 592 mg, manganese 4.54 mg, zinc 7.8 mg, and selenium 9.40 ug. Solid phytochemicals including betacarotenoids 9 µg, beta-cryptoxanthin 1 µg, and lutein zeaxanthin 74 µg. Yellow pumpkin seeds are rich in oil and protein. It has more nutrition for health. Yellow pumpkin seed extract contains lignans and flavones (Musaidah *et al.*, 2021).

The 2nd non pharmacology therapy in 1st group is papaya fruit (*Carica Papaya L*). Giving papaya fruit at a dose of 110 grams daily for 14 days combined with taking Fe tablets. California papaya was chosen because it has good quality, red and sweet proven to increase hematocrit (ht) and Hb pregnant women. Papaya has composition, namely vitamin C (78 mg/ 100 grams of papaya) and Fe (iron), but the content of vitamin C itself can help increase the absorption of iron in the body. The role of vitamin C in the Fe absorption process is to reduce Ferric iron (Fe 3 +) to Ferro (Fe 2 +) in the intestinal so that iron is easily absorbed by the body (Eliagita *et al.*, 2017).

In addition, non pharmacology therapy in 1st group at 3rd order is papaya leaf juice (*Carica Papaya L*). The best concentration of papaya leaf juice that most effectively increases Hb levels of pregnant women is the consumption of 75% papaya leaf juice (5.25x106 / mm3) consumed for 14 days. The content of Fe and vitamin C in papaya leaf juice can increase the number of erythrocytes of anemic wistar rats. Furthermore, the content of vitamin A can affect the formation of hemoglobin and very good for maintaining the health of epithelial tissue including the endothelium in blood vessels. The presence of adequate vitamin A in the body in pregnancy will increase the Hb value (Hamidah, Anggereini and Nurjanah, 2017).

The 4th non pharmacology therapy in 1st group is an avocado juice (*Persea Americana Mill*). Avocado is a fruit that rich in vitamin A, 180 IU/ 100 grams and Fe. Vitamin A is needed in several important processes of the body such as metabolism, hematopoiesis, erythropoiesis, regulation of sexual differentiation, plays a role in the immune system including the formation of erythrocytes, to synthesize proteins that will impact the growth of bone cells. The formation of Hb in the blood requires three basic ingredients, namely Fe, folic acid, and vitamin C. Avocado contains vitamin C nutrients, namely 13mg/ 100 gram, Fe 1 mg/ 100 gram and vitamin A 146 IU/ 100 gram. This study is in line with study that conducted by Feriyal which also says that there is an effect of giving avocados for 14 days to increase Hb (Utari, Setyaningsih and Suwondo, 2020).

The 5th non pharmacology therapy in 1st group is red spinach juice (*Amaranthus Tricolor*). In every 100 grams of red spinach, is there energy 41.2 kcal, 6.3 grams of carbohydrate, 2.2 grams of protein, 0.8 grams of fat, 520 mg of Ca, 2.2 grams of fiber, 62 mg of vitamin C, and 7 mg of Fe and several other vitamins. The main type of carotenoid in red spinach is beta carotene. Whereas the other active substance is chlorophyll (Simatupang, 2021).

The red spinachs contained flavonoids i.e lutein and quercetin. It is powerful antioxidants that can trap superoxide free radicals and limit the oxidation of lowdensity lypo protein (LDL) cholesterol. Any two types of spinach, namely green spinach and red spinach. Both of them are rich in vitamin C, but red spinach contain more Fe and green spinach contain rich in vitamin A. Therefore, consumption red spinach juice every day can be used as an alternative therapy to prevent anemia in

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pregnancy (Simatupang, 2021).

The 6th non pharmacology therapy in 1st group is a decoction of sweet potato leaves (*Ipomoea Batatas*). One of them that can increase hemoglobin which it is vegetables. It is sweet potato leaves. A decoction of sweet potato leaves contains vitamins and minerals that needed by the human body. Minerals such as Ca, F, Fe, Na and K are abundant in sweet potato leaves, in each decoction of 100 grams of sweet potato leaves contains 117 mg of Ca, 1.8 mg of Fe, 3.5 mg of carotene, 7.2 mg of vitamin C, 1.6 mg of vitamin E and vitamin K 0.5 mg, vitamin B, and beta-carotene.The role of vitamin C is to accelerate the absorption of Fe in the body or intestine, so that anemia can be resolved and Fe minerals are needed to carry oxygen throughout the body (Awatiszahro and Sabda, 2021).

The 7th non pharmacology therapy in 1st group is red guava (*Psidium Guajava L.*). Consumption of red guava juice at a dose of 250 ml every day for 2 weeks is proven to increase hemoglobin quickly (Olii *et al.*, 2022). Each 100 mg guava contains 49 calories, 0.9 gram protein, 0.3 gram fat, 12.2 gram carbohydrates, vitamin A 25 IU, vitamin B1 0.05 mg, 14 mg calcium, 28 mg phosphorus, 1.1 mg iron, and 86 gram water. Red guava is also high in vitamin C (300-400 mg). Vitamin C can increase 4 times the absorption of non-heme Fe and by 400 mg vitamin C will increase 50% Fe absorption (Olii *et al.*, 2022).

The 8th non pharmacology therapy in 1st group is roselle extract (*Hibiscus Sabdrariffah*). The experimental group that giving rosella extract at a dose of 115.2 mg/ kg body weight/ day for 10 days and combination with Fe tablets consumed in midnight; while the control group was given Fe tablets only. Every 100 grams of dried rosella extract contains 260-280 mg of vitamin C, vitamins D and vitamin B2. Vitamin C content in dried rosella extract is 2.5 times higher than guava, 3 times higher than black grapes, 9 times higher than oranges, 10 times higher than star fruit. In addition, it contains high Ca (486 mg/ 100 grams), Mg and omega-3, vitamins A, Fe, potassium (K), beta carotene and essential fatty acids (Nisa, Soejoenoes and Wahyuni, 2017).

The 9th non pharmacology therapy in 1st group is catfish. This study was conducted on pregnant women in the third trimester before and after giving fried catfish cake. Fried catfish cake gave during the 3rd trimester of pregnancy is proven to increase Hb levels. Changes in the 3rd trimester of pregnancy are in the form of increased basal metabolism, appetite is quite good, and usually the mother always feels hungry. This is due to the rapid growth of the fetus. Therefore, various possibilities can occur including anemia in pregnancy. In 100 gram of catfish contains high protein, omega 3 fatty acids, F, vitamin B12 (Suryani *et al.*, 2021).

The 10th non pharmacology therapy in 1st group is green bean juice (*Phaseolus Radiatus L.*). Consumption of green beans at a dose of 100 mg and Fe 1x1 supplements for 20 days obtained average Hb levels in the experimental group was 12.1588 gram/ dL. Green beans are a type of legume with a high Fe content, especially in embryos and seed shells. The nutritional composition is beneficial for pregnancy to produce erythrocytes and prevention of anemia. It contains phytochemicals which help the hematopoiesis process, other nutritional elements, namely Ca, phosphorus (F), Fe, Na, and Kalium. It has beneficial for pregnant women. The green beans content of Fe per 100 grams is 6.7 mg (Hidayati and Roviatun, 2021).

The 11th non pharmacology therapy in 1st group is the provision of boiled chicken eggs. The content in 1 chicken egg is good energy for the body in pregnant women. Either boiled, half-cooked or scrambled can increase the number of erythrocytes. Nutritional elements in 1 boiled chicken egg contain 154 k.cal of energy, protein 12.2 gram, carbohydrate 0 gram, fat 0 gram, Ca 54 mg, Phosphorus 0 mg, and Fe 2.7 mg. Fe can increase hemoglobin in malnourished on pregnant women, while protein is a substance responsible for building muscles, body tissues, bone tissue which is also very important for fetal growth and development (Rofiah and Mawarti, 2022).

The 12th non pharmacology therapy in 1st group is soy milk. The results showed a significant result in hemoglobin levels after being given homemade soy milk for 3 months

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(Farisni, Fitriani and Yarmaliza, 2019). Soybeans rank 3rd in Fe content after meat and cereals at 8.8 mg. To get good soy milk and suitable for human consumption, its manufacture has several requirements needed, namely free from soy smell and taste, antitrypsin-free, and has good colloidal stability. Homemade soy milk added honey can help meet the nutritional needs of pregnant women, especially the needs of Fe and protein to prevent anemia. Both soy milk and honey contain 8.8 mg and 0.9% Fe, respectively. Honey added to homemade soy milk is a sugar substitute because honey is healthier. In addition, honey is also a source of vitamins and minerals. It is very easily digested by the most sensitive stomach, making it suitable for consumption by pregnant women (Farisni, Fitriani and Yarmaliza, 2019).

Furthermore, the 13th non pharmacology therapy in 1st group is honey. As explained earlier that honey has many benefits and good nutritional content. Giving honey for 15 days/ 100 ml can increase hemoglobin levels in pregnant women. The nutritional content of honey can provide benefits and provide beneficial effects from different antioxidants, especially vitamins C and E, which are found in various models of healing diseases in mice and humans using active antioxidants (Hotima *et al.*, 2022).

CONCLUSION

There are 23 non pharmacology therapies that can increase hemoglobin in pregnant women grouped into 3 groups ranging from the most effective, effective, and quite effective. Non pharmacology therapy in the 1st group that the most effective, namely yellow pumpkin seeds, papaya fruit, papaya leaf juice, an avocado juice, red spinach juice, sweet potato leaf decoction, red guava, roselle tea, fried catfish, green bean juice, boiled chicken eggs, soy milk, honey.

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