Journal of Midwifery and Nursing, 6 (3) (2024) pp. 639-645

Published by: IOCSCIENCE

Journal of Midwifery and Nursing

Journal homepage: www.iocscience.org/ejournal/index.php/JMN

Comparison of Consumption of Seaweed and Soybeans on Increasing Hemoglobin Levels in Pregnant Women at the Samkai Community Health Center, Merauke Regency

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ARTICLE INFO

Article history:

Received Jun 23, 2024
Revised Jun 27, 2024
Accepted Jul 3, 2024

Keywords:

HB Levels;
Pregnant Mother;
Seaweed;
Soybeans.

ABSTRACT

Reduced Hb concentration during pregnancy results in reduced oxygen supply to all body tissues, causing signs and symptoms of anemia. You can increase Hb by consuming seaweed and soybean juice, because both contain iron, minerals, vitamin B complex and protein. This research aims to determine the comparison of consumption of seaweed and soybeans on increasing hemoglobin levels in pregnant women in the Samkai health center working area. Quasi-experimental research design with a one group pretest-posttest design. Using purposive sampling technique, a sample of 30 respondents was obtained, the independent variable was consumption of seaweed and soybeans. The dependent variable is an increase in Hb levels. Data collection uses observation with the Chi-Square statistical test. The research results showed that half of the respondents aged over 30 years were 17 respondents (57%), more than half of the multigravida parity respondents were 21 respondents (70%), the average Hb before being given soybeans was 9.5 gr/dl and after being given beans soybeans increased to 10.5 gr/dl while the average Hb before being given seaweed was 9.6 gr/dl and after being given seaweed the Hb increased to 10.3 gr/dl. There was an increase in Hb before and after consuming soybeans. Giving soybeans is more efficient in increasing Hb levels in pregnant women by 0.2 gr/dl compared to giving seaweed.

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1. Introduction

Pregnancy is defined as fertilization or union of spermatozoa and ovum and followed by nidation or implantation, if calculated from the time of fertilization until the birth of the baby, a normal pregnancy will take place within 40 weeks or 10 lunar months or 9 months according to the international calendar. Pregnancy is divided into 3 trimesters, where the first trimester lasts 12 weeks, the second trimester 15 weeks (weeks 13 to 27) and the third trimester 13 weeks (weeks 28 to 40) (Retnaningtyas, 2021).

Anemia is a condition where red blood cells do not meet the body's physiological needs. These physiological needs are different for each person, which can be influenced by gender, place of residence, smoking behavior, and stage of pregnancy (Elmika et al., 2018). Based on WHO, anemia in pregnancy is confirmed if the hemoglobin (Hb) level is <11 g/dL (WHO, 2021). Meanwhile, the Center for

Disease Control and Prevention defines anemia as a condition with Hb levels <11 g/dL in the first and third trimesters, Hb <10.5 g/dL in the second trimester, and <10 g/dL in postpartum (Kemenkes RI, 2021).

The World Health Organization (WHO) reports that the prevalence of pregnant women throughout the world who experience anemia is 41.8%.(WHO, 2020). The prevalence of anemia in pregnant women in America is 24.1%, Europe 25.1%, West Pacific 30.7%, countries in Africa 57.1% and in Southeast Asia 48.2% (Prakash, S., 2020).

Anemia in pregnant women is still a global public health problem, including in Indonesia. Globally, the prevalence of anemia in pregnant women in 2019 was 36.5% (WHO, 2020). Based on the results of Riskesdas (2018), the prevalence of anemia in pregnant women also shows an upward trend due to an increase in 2013 by 37.1% to 48.9% in 2018 (Riskesdas, 2021). Based on data from the Papua Provincial Health Service in 2019, the number of pregnant women in the Merauke region was 5,470, but only around 3,292 (60.2%) consumed blood supplement tablets. This shows a decrease of around 20% from 2017 which was recorded at 80.2% of mothers who consumed blood supplement tablets (Dinas Kesehatan Merauke, 2022). Data from the Samkai Community Health Center based on medical records from the Maternal and Child Health Services Polyclinic at the Samkai Community Health Center in 2020, 32% of the total number of pregnant women experienced anemia. Efforts that have been made to reduce anemia in pregnant women include monitoring by providing Fe tablets and education about preventing anemia (Puskesmas Samkai, 2022)

Reduced Hb concentration during pregnancy results in reduced oxygen supply to all body tissues, causing signs and symptoms of anemia. In general, the symptoms experienced by pregnant women with anemia include: the mother complains of feeling weak, lethargic, tired, dizzy, reduced energy, dim eyesight, especially when getting up from sitting. Apart from that, through physical examination you will find signs in pregnant women such as: the face, mucous membranes of the eyelids, lips and nails of the sufferer appear pale. Even in people with severe anemia, it can result in shortness of breath or even heart failure (Retnaningtyas et al., 2017).

Controlling anemia can be done by providing other alternatives such as consuming blood supplements, improving maternal nutrition, consuming iron-rich foods which can help increase hemoglobin levels. Some examples of foods that can help increase maternal hemoglobin levels include green spinach, cassava leaves, nuts, fish and fruit such as Ambon bananas, and date juice. However, apart from medicinal supplements, iron and folic acid supplements can also be obtained from food, for example: avocado, vegetables, chicken, beef, lamb, offal, soybeans, green beans, almonds, wheat, coriander seeds, spinach leaves , seaweed, tuna, fermented products such as tofu, tempeh and others (NAPISAH et al., 2023).

Normal pregnant women need 27 grams of HB (WHO, 2021). 100 grams of fresh seaweed has an Fe content of 32 mg/100 grams and has the benefits of preventing anemia, maintaining body weight, optimizing the growth of the baby in the womb, supporting brain development of the baby in the womb, maintaining health because it contains antioxidants (Arianti et al., 2021). Meanwhile, 200 grams of soybeans have an Fe content of 31.4 Mg/200 grams. There are many benefits of soybeans, namely preventing anemia, reducing the risk of bleeding during childbirth, reducing the risk of premature babies, increasing metabolism in the body, preventing constipation, improving the immune system, Strengthens fetal bones and teeth, controls blood pressure, controls cholesterol levels (Al-Matani et al., 2023).

Based on the results of interviews conducted by the author at the Samkai Community Health Center, of the 10 respondents who experienced anemia, 6 (60%) respondents said they had never consumed soybeans and seaweed and 4 (40%) respondents said they had consumed processed soybeans but rarely consumed them. . The pregnant woman experienced anemia and said she had never received non-pharmacological treatment to reduce anemia, one of which was giving seaweed and soybean juice (Puskesmas Samkai, 2022)

In research conducted by Rifa Rahmi (2017) on consuming seaweed for pregnant women with anemia, the comparison before being given the intervention was 8.94 gr/dl to 10.72 gr/dl after being given the intervention.(Rahmi, 2018). Likewise with research conducted by Adinda Valentina (2020)

regarding giving soybean juice to pregnant women before and after being given soybean juice, namely that there was a difference in the increase in hemoglobin levels between the intervention group and the control group. The average increase in hemoglobin in the control group was 0.57g/dl, while in the intervention group it was 0.87g/dl. (Valentina et al., 2021). Thus seaweed and soybean juice are very effective in increasing Hb levels in anemic pregnant women. It is recommended that pregnant women independently seek information about the content of seaweed and soybean juice and also the processing process in an effort to increase Hb levels.

Based on the description above, researchers are interested in examining the comparison of consumption of seaweed and soybeans on increasing hemoglobin levels in pregnant women in the working area of the Samkai Community Health Center, Merauke Regency.

2. Research Method

The design used in this study was quasi-experimental which compared two groups, namely the seaweed intervention group and the soybean intervention group to increase the HB levels of pregnant women who experienced mild anemia. An assessment of the difference in the increase in HB levels before and after treatment was carried out (Pretest and Posttest two Group Design). Using a purposive sampling technique, a sample of 30 respondents was obtained with the criteria that pregnant women who suffer from anemia are not allergic to soybeans and seaweed, the independent variable was consumption of seaweed with 15 pregnant women as respondents and soybeans with 15 pregnant women as respondents. The dependent variable is an increase in Hb levels. Data collection uses observation with the Chi-Square statistical test.

3. Resulth And Discussions

Respondent Characteristics

Table 1.
Distribution of Respondent Characteristics

Respondent Characteristics	Seaweed		Soybeans		Amount	
	n	%	n	%	n	%
Age						
17 – 20 old	2	14 %	2	14%	4	13%
21 – 30 old	5	32 %	4	26%	9	30%
> 30 old	8	54 %	9	60%	17	57%
Parity						
Primigravida	4	26%	5	32%	9	30%
Multigravida	11	74%	10	68%	21	70%
Total	15	100%	15	100%	30	100%

Based on Table 1 above, in the seaweed group, it is known that of the 30 respondents, half of the respondents were over 30 years old, namely 17 respondents (57%). Researchers assume that the age range of respondents has a greater risk after the age of 30 years and over. Pregnant women aged less than 20 years have a greater risk of experiencing anemia than those aged 20-30 years. After the age of 30 years, the risk of anemia will increase depending on socio-economic and environmental conditions. In addition, the risk of maternal mortality and morbidity increases when giving birth too young, namely under the age of 20 years and too old, namely over the age of 35 years. Physical and psychological factors are also factors that cause anemia due to decreased body resistance and nutritional deficiencies (Astriana, 2018).

Amimi and Catur Esti (2018) stated that the number of anemia sufferers increases with increasing gestational age because the need for iron also increases which is influenced by the fetus. The research results show that the mothers who experience anemia most often are mothers aged around 20 to more than 30 years and this age is actually a safe age for pregnancy and childbirth. This shows that the occurrence of major anemia is influenced by a lack of iron intake during pregnancy due to increased

iron requirements for the fetus. The older the gestational age, the greater the need for iron which will increase blood volume and reduce iron reserves in the mother's body (Amini et al., 2018).

Based on Table 1, it is known that of the 30 respondents, more than half of the respondents were multigravida parity, namely 21 respondents (70%). The parity category is divided into 2, namely primigravida parity and multigravida parity. Primigravida parity is defined as the first pregnancy, while multigravida parity is more than one pregnancy (Andi Yuniarsy Hartika, Gusni Fitri, 2023). Primigravida and multigravida pregnant women are at risk of developing anemia during pregnancy. Anemia in primigravida pregnant women is influenced by an unbalanced diet before pregnancy until it continues after entering pregnancy, while anemia in multigravida pregnant women occurs due to a history of too frequent births, causing a greater increase in blood plasma volume and resulting in greater blood thinning. . High parity anemia increases the risk of postpartum hemorrhage. Multiparities are at higher risk of developing anemia than low parity mothers because pregnancy and childbirth deplete iron reserves in the body (Astriana, 2018).

Table 2.
Distribution of Average Hemoglobin Levels pre test and post test Seaweed Consumption

Group	N	Min	Max	Mean	Δ Mean	SD
Pre test	15	9,50	9,80	9,6	2,01	0,395
Post test	15	10,90	15,30	10,3		0,490

Based on table 2 above, it is known that the average Hb of respondents before being given seaweed was 9.6 gr/dl with a minimum HB level of 9.50 gr/dl and after being given seaweed the respondent's HB increased to 10.3 gr/dl with a minimum HB level. 10.90 gr/dl and Maximum 15.30 gr/dl. The bioavailability of substances contained in seaweed is around 2-10% higher compared to vegetables, because the phytic acid content in seaweed which can interfere with iron absorption is very small (Wulandari et al., 2024).

The seaweed used is seaweed of the Eucheuma Sp type. Eucheuma Sp is seaweed which can stabilize the number of red blood cells, white blood cells and hemoglobin. Apart from that, seaweed functions to reduce the side effects of inhibiting the production of cells that produce blood cells. Based on statistical analysis in this study, it was found that consuming seaweed in one month can increase Hb levels by 0.7 gr% in anemic pregnant women (Rahmi, 2018).

Seaweed contains vitamins B6 and B12 which are needed in hemoglobin synthesis. Vitamin B6 and amino acids and glycine in the initial reaction to form heme. Vitamin B6 and vitamin B12 are required for globin synthesis. Furthermore, the interaction between heme and globin will produce hemoglobin. Regular consumption of seaweed apparently has an effect on increasing hemoglobin levels in anemia sufferers. According to researchers' assumptions, non-pharmacological treatment for anemia needs to be applied to pregnant women who suffer from anemia. Apart from the ingredients being easy to obtain, consuming them in the long term certainly does not have a bad effect on the health of pregnant women and also on the fetus they are carrying (NAPISAH et al., 2023). Researchers believe that consuming seaweed can overcome the problem of anemia in pregnant women.

Table 2.
Distribution of Average Hemoglobin Levels pre test and post test Soybean Consumption

Group	N	Min	Max	Mean	Δ Mean	SD
Pre test	15	9,80	10,50	9,5	1,52	0,561
Post test	15	11,90	14,80	10,5		0,726

Based on table 4.3 above, it is known that the average Hb of respondents before being given soybeans was 9.5 gr/dl with a minimum HB level of 9.80 gr/dl and after being given soybeans the respondent's HB increased to 10.5 gr/dl with a minimum HB level. 11.90 gr/dl and Maximum 14.80 gr/dl.

Giving soy milk can increase the need for iron which cannot be met adequately through food every day. The iron in soy milk is useful for increasing red blood cells in pregnant women (Al-Matani et

al., 2023). According to researchers, anemia during pregnancy can be caused by inadequate food intake which causes insufficient iron available during pregnancy and hemoglobin levels in the blood decrease. Food intake is very necessary to meet the needs of the mother and fetus during pregnancy. The results of this study are in line with the results of research by Valentian (2021) at the Lepo-Lepo health center, Kendari city, it was found that the average increase in hemoglobin in the intervention group was an average of 0.416 gr/dl or 0.42 gr/dl, while in the intervention group the average 0.16 gr/dl or 0.2 gr/dl. According to research results, anemia during pregnancy can be caused by insufficient iron intake, inadequate absorption, increased need for iron to form red blood cells for the baby's growth and consumption patterns of iron tablets (Valentina et al., 2021).

Soy milk contains high levels of iron, protein and vitamin C. The iron in soy milk is useful for increasing red blood cells so that hemoglobin levels increase. Iron is a mineral needed to form red blood cells. Apart from that, this mineral also functions as a component to form myoglobin (a protein that carries oxygen to muscles). One important source in the process of forming red blood cells is iron. Sources of iron include animal foods, such as meat, chicken and fish. Other good sources are eggs, mashed serial, green vegetables, fruit and nuts.(Rinawati, 2024). Soy milk is a fairly good source of protein, fat, vitamins, minerals and fiber. Soy milk can treat several diseases such as diabetes mellitus, kidney disease, rheumatism, diarrhea, hepatitis, hypertension and anemia (Muaris, 2018).

Table 4.
Differences in the Effectiveness of Increasing Hb Levels in Pregnant Women after being given Soybeans and Seaweed

Variable	N	Min	Max	Mean	SD	p-value
Soybeans	15	10,90	15,30	10,5	0,726	0,000
Seaweed	15	11,90	14,80	10,3	0,490	

The statistical test results in table 4 show that giving soybeans and seaweed there is a difference in increasing HB levels in pregnant women with a value of P=0.00 (P<0.5). The average value of increase in HB levels was higher in the soybean group compared to the seaweed group with a mean difference of 0.20 9r/dl. The results of the analysis concluded that giving soybeans increased the HB levels of pregnant women more than giving seaweed.

This is in line with research by Rifa Rahmi (2018) which shows that the majority of pregnant women's Hb before being given seaweed was 8.9 gr/dl, the lowest Hb was 7 gr/dl and the highest was 9.8 gr/dl (Rahmi, 2018). The majority of Hb of pregnant women after being given seaweed was 10 gr/dl, the highest Hb was 12.7 gr/dl and the lowest was 7 gr/dl, and by Yuni (2018) at the Sarwodadi Community Health Center, Pemalang Regency, it was found that the average increase in hemoglobin in the intervention group was average. -average 0.416 gr/dl, while in the intervention group it was 0.16 gr/dl or 0.2 gr/dl (Yuni, 2019). The results of previous research showed that there was an effect of consuming seaweed (Eucheuma sp) on increasing hemoglobin levels with a p value of 0.004 (p<0.005) with changes in Hb levels before and after being given seaweed of 1.45 gr/dl. (Arianti et al., 2021) This research is also in line with research by Noviati (2019) entitled the effect of giving soy milk on the hemoglobin levels of pregnant women in the third trimester in the city of Bengkulu. It was found that there was an effect of giving soy milk on the hemoglobin levels of pregnant women in the third trimester in the city of Bengkulu with a P value of 0.000 (Novianti et al., 2019). The results of this research are also in line with research by Umadji (2019) which found that there was an effect of consuming soy milk on increasing hemoglobin levels in pregnant women in Sidulang I sub-district, Tuminting Health Center area, Menado City with a P value of 0.000 (UMADJI, 2019).

According to researchers' assumptions, anemia during pregnancy can be caused by inadequate food intake which causes insufficient iron available during pregnancy and hemoglobin levels in the blood decrease. In this study, researchers can conclude that seaweed and soybean juice regularly have an effect on increasing hemoglobin levels in anemic pregnant women. Seaweed and soybean juice have various ingredients that are good for increasing the Hb levels of pregnant women, so that pregnant women who have low Hb will experience an increase and according to researchers' assumptions, non-

pharmacological treatment for anemia needs to be applied to pregnant women who experience anemia, in addition to ingredients that are easy to obtain, consuming them in the long term certainly does not have a bad effect on the health of pregnant women and also on the fetus that is pregnant so that it does not feel anxious and afraid about its condition during pregnancy or during the upcoming birth process.

4. Conclusion

Based on the results of research regarding the difference in the effectiveness of seaweed and soybeans in increasing the HB levels of pregnant women at the Samkai Community Health Center, Merauke Regency for 30 pregnant women, it can be concluded that the average Hb in pregnant women before being given seaweed was 9.6 gr/dl and the average Hb in pregnant women after being given seaweed was 10.3 gr/dl. The average Hb in pregnant women before being given soybeans was 9.5 gr/dl and the average Hb in pregnant women after being given soybeans was 10.5 gr/dl. There is a difference in the effectiveness of giving seaweed and soybeans to increase the Hb levels of pregnant women by 0.20 gr/dl. Giving jam beans increases Hb levels in pregnant women more than giving seaweed in increasing Hb levels in pregnant women. Researchers could not control other foods containing HB consumed by pregnant women during the study. It is hoped that the rate of pregnancy anemia in Merauke district can decrease, especially in the Samkai Community Health Center, one of which is through non-pharmacological efforts, namely providing seaweed and soybeans.

Acknwledgements

Thanks are given to Mrs. Christina L Aulorlo, SKM as Head of the Samkai Community Health Center, Merauke Regency, all pregnant women who were respondents in this research, Mr. Drs. Romanus Mbaraka, MT as Regent of Merauke, Mr. Salfianus Laiyaan as Head of the Merauke Civil Service Agency and Staff, Dr. Nevile Muskita as Head of the Merauke Health Service, Mrs. Iryani Winoto as Chair of the Merauke Regency Midwives Association, Dr. Sentot Imam Suprapto, MM as Chancellor of IIK Strada and Staff, and to all parties involved has helped in the preparation of this research

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