THE 5th INTERNATIONAL CONFERENCE ON HEALTH POLYTECHNICS OF SURABAYA (ICOHPS)
2nd *International Conference of Medical Laboratory Technology* (ICoMLT)

RELATIONSHIP OF HEMOGLOBIN LEVELS TO IRON (FE) LEVELS OF MATURE BREAST MILK IN NURSING MOTHERS IN SAMARINDA

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Abstract

Breastmilk is the best natural nutrition for babies because it contains the energy and substance needed for the first six months of a baby's life. A mother often experiences problems in exclusive breastfeeding, one of the main obstacles is a decreased hemoglobin level which causes milk production that is not smooth and results in a decrease in the nutritional content of breast milk.The purpose of this research is to know the relationship between hemoglobin levels and iron (Fe) levels in mature breast milk in breastfeeding mothers. This type of research is analytic observational with a cross-sectional design, with a purposive sampling technique. Examination of the hemoglobin levels using the POCT method and for Fe levels using the AAS method. The number of samples used was 30 samples. The results showed that the age of breastfeeding mothers with mature breast milk was in the range of 19 - 37 years. The results of the measurement of hemoglobin levels are in the range of 11.2 - 15.5 gr/dl and the results of measurement of Fe levels with a range of 0.32 - 1.92 mg / L. Data processing was analyzed using statistical analysis of relationships. The results of this study indicate that there is a relationship between hemoglobin levels and iron (Fe) levels of mature breast milk in breastfeeding mothers as indicated by a statistical test that obtained a value of p = 0.000. Based on these results, it can be concluded that there is a relationship between hemoglobin levels and iron levels in mature breastfeeding mothers in Samarinda.

Keywords*: Hemoglobin, Iron Level, Breastmilk*

INTRODUCTION

Breast milk is the best natural nutrient for babies because it contains the need for energy and substances needed during the first six months of the baby's life. A mother often experiences problems in exclusive breastfeeding, one of the main obstacles is a decrease in maternal hemoglobin which causes uneven milk production. This is one of the factors causing the low

coverage of exclusive breastfeeding to newborns (Wulandari and Handayani, 2011).

According to Yi et al (2013), in the poor outcome of the birth of a baby, there is a relationship with the mother's hemoglobin (Hb) level, especially in the decreased Hb level, namely in mild anemia and moderate anemia. In mothers who experience anemia during pregnancy, it can be caused by several factors including malnutrition, lack of iron intake (Fe), malabsorption, excessive blood loss during childbirth or past menstruation, and the presence of chronic diseases such as pulmonary tuberculosis, helminthiasis, and malaria (Purbadewi, 2013).

The lack of iron (Fe) intake has an impact on reducing hemoglobin levels which causes an anemic state in pregnant women and indirectly also has an impact on the growth and development of the fetus. Other impacts are abortus, parturition premature,oldparturition, postpartum hemorrhage, shock, and infection (Prawirodharjo, 2010). According to Bora et al (2013), anemia in mothers is related to low gestational age, low birth weight babies (BBLR), and an increased risk of small births for their gestational age.

The iron (Fe) content in both breast milk (breast milk) and formula milk is both low and varied. According to Hendarto and Pringgadini (2013) the absorption of zinc in breast milk, cow's milk, and formula milk is 60%, 43-50%, and 27-32%, respectively. However, babies who get breast milk have a smaller risk of experiencing iron deficiency than babies who get formula milk. This is because iron derived from breast milk is more easily absorbed, which is 20-50% compared to only 4-7% in formula milk.

Breast milk is an ideal food for babies to be able to grow optimally, in both brain and physical development. Until the age of 6 months, the baby still has a growing body according to the standard curve. In this period, the baby can grow and develop optimally only by relying on the nutritional intake of breast milk. For newborns, their entire need for vitamins and minerals will be met through breast milk, since breast milk contains high-quality nutritional components and is useful for the intelligence, growth, and development of the child. Breast milk has so many advantages that it is recommended to be given to babies up to 2 years of age and is recommended for 6 months of the baby's age exclusively (Istiany and Rusilanti, 2013).

In a preliminary study that has been conducted at the Karang Asam Samarinda Health Center until August 2019, it shows that 73 pregnant women have a history of anemia, 18 pregnant women suffer from Chronic Energy Deficiency (SEZ), and 66 breastfeeding mothers have a history of anemia. This shows that anemia in pregnant women is still a health problem in Samarinda.

In a study conducted by Siti Helmyati dkk (2003), hemoglobin levels in nursing mothers are related to iron (Fe) levels in breast milk. Of the 158 samples of nursing mothers, 55 (34.8 %) found anemia at 4 months after delivery and 103 (65.2 %) had no anemia. It was found that every 1 unit of hemoglobin concentration increase was

associated with an increase of 0.098 units of iron content (Fe) (p=0.058)

Based on this background, researchers are interested in conducting a study with the title of the relationship of hemoglobin (Hb) levels to iron (Fe) levels of mature breast milk in breastfeeding mothers in Samarinda

RESEARCH METHODS

The type of research used is an observational research method with a research essay that is used is *Cross-Sectional*, which is a type of research that emphasizes the time of measurement or observation of related free variable data and depends only once on one time when the research was conducted at PT Global Environment Laboratory ataxis road Samarinda – Bontang Gg. 16 No.77 RT.006 Kelurahan Lempake Samarinda. This research was conducted on February 12-13, 2020. The number of samples in this study was 30 people. The sampling technique in this study was *purposive sampling*. The variables studied included hemoglobin caudate and iron levels of mature milk.

Table 1 Operational Definitions

No.	Variable	Operational Definition	Objective Criteria	Scale
1.	Up to Hemoglobin	The result of hemoglobin levels of nursing mothers with the POCT method	Normal limit: 12–15 g/dl	Ratio
2.	Iron levels	The results of the quantitative examination of iron levels in Mature breast milk	Normal limit : 0.5 mg/L	Ratio

Source: Primary Data 2020

RESULT

The results of the study can be seen as follows

a. Age Characteristics

Table 2 Age Distribution of Breastfeeding Mothers of Mature Breast milk

No.	Age (Th)	n	%
1.	19 – 23	1	3,3
2.	24 – 28	6	20
3.	29 – 33	17	56,7
4.	≥ 34	6	20
	Sum	30	100

Based on table 4.2, it can be seen that the age of breastfeeding mothers is dominated at the age of 29-33 years, namely, 17 respondents (56.7%), aged 24-28 years and ≥ 34 years the same there are 6 respondents (20%), while aged 19-23 years there is 1 respondent (3.3%).

b. Up Hemoglobin

Table 3 Distribution of Hemoglobin Levels of Breastfeeding Mothers of Mature Breast Milk

No.	Up to Hemoglobin (g/dl)	n	%
1	9,0 - 11,9	9	30
2	12,0 – 14,0	19	63,3
3	≥14,1	2	6,7
	Sum	30	100

Source: Primary Data 2020

Based on table 4.3, it was found that the hemoglobin level range of 12.0 – 14.0 gr/dl there were 19 respondents (63.3%), hemoglobin levels ≤11.9 gr/dl there were 9 respondents (30%), and hemoglobin levels ≥14.1 gr/dl there were 2 respondents (6.7%)

c. Felevelsof mature breast milk

Table 4 Distribution of Fe Levels of Mature Breast milk

No.	Kadar Fe (mg/L)	n	%
1	0,00 - 0,49	5	16,7
2	0,50 – 1,0	18	60
3	≥1,0	7	23,3
	Sum	30	100

Source: Primary Data 2020

Based on table 4.4, it was found that the range of Fe levels of 0.50–1.0 g/L there were 18 respondents (60%), Fe levels ≥1.0 g/L there were 7 respondents (23.3%), and Fe levels of 0.00 - 0.50 g/L there were 5 respondents (16.7%). Analysis of the Relationship of Hemoglobin Levels to Iron Levels of Mature Breast Milk

Table 5 Relationship Analysis Results

No	Variable	P-value	A
1.	Hb	0.000	0,05
2.	Fe		

The results of the analysis obtained significant results on hemoglobin levels to Fe levels (p) = 0.000 (p < 0.05) which means that there is a relationship between hemoglobin levels and iron levels.

DISCUSSION

This study was conducted with respondents of breastfeeding mothers who had mature breast milk and a total of 30 people located in Samarinda City. Hemoglobin levels were checked by the POCT method and iron levels were checked with AAS and assessed quantitatively. Hemoglobin level examination is carried out directly when sampling with POCT and then recorded, while breast milk samples are accommodated first in the container that has been provided and then tested in the laboratory. Breast milk samples must be taken to the laboratory immediately using a coolbox because breast milk cannot last <2 hours if it is at room temperature. Before testing the breast milk sample, a digestion process is carried out first. The digestion process is carried out by adding HNO3(p) and then heating up until the sample is completely clear. After digestion, the sample is filtered so that a yellowish clear sample is produced, this shows that the sample has been completely destructed.

Based on research that has been carried out on 3-respondents, it was found that the age of breastfeeding mothers was mostly dominated in the age range of 29-33 years, namely 17 respondents (56.7%). Meanwhile, for the age of 24-28 years and the ≥ of 34 years, there are the same 6 respondents (20%), while for the age of 19-23 years, there is 1 respondent (3.3%).

Then in table 4.3, it was found that the range of hemoglobin levels 12.0–14.0 gr/dl there were 19 respondents (63.3%), hemoglobin levels ≤11.9 gr/dl there were 9 respondents (30%), and hemoglobin levels ≥14.1 gr/dl there were 2 respondents (6.7%) months. In this case, most of the mother's Hb levels are still at normal limits, and there are only a few mothers who have mild anemia. This is because the mother's hemoglobin level is at ≤ 11.9 g / dl and belongs to the category of mild anemia. Mild anemia in breastfeeding mothers only affects the quality of breast milk, while severe anemia (<8 g / dl) will affect the quality and quantity of breast milk (WHO, UNICEF, 2001). The state of mild anemia often does not cause visible symptoms but in the long run, it can have the effect of becoming severe anemia and can affect the nutritional status of the baby gradually so that if not treated immediately it can affect the nutritional status of the baby until the age of 2 years old (Indonesian Pediatric Association, 2011).

Nutritional intake becomes one of the factors that affect hemoglobin levels in the blood, the important nutritional controls in the formation of hemoglobin are iron, vitamin C, and protein. Iron functions as a means of transporting oxygen from the lungs to the entire tissue, besides that iron also functions as a former of hemoglobin (Soedjianto, 2015). Maternal adherence during pregnancy in consuming Fe tablets is also very important. The more obedient pregnant women's consumption of Fe tablets is getting smaller and less likely to have anemia in their lives. The compliance of pregnant women consuming Fe tablets has a strong relationship with the Hb levels of the mother of inspiration so the more obediently pregnant women consume Fe tablets the higher the Hb of the pregnant woman. Iron or Fe tablet is one of the important elements in the formation of blood cells or Haemoglobin (an oxygen-carrying protein) containing200 mg of fero sulfate equivalent to 60 mg of elementary and 0.25 mg of folic acid which can increase Hb levels quickly (Sifik,2011).

Based on table 4.4, it was found that the range of Fe levels of 0.50–1.0g/L there were 18 respondents (60%), Fe levels ≥1.0 g/L there were 7 respondents (23.3%), and Fe levels of 0.00 - 0.50 g/L there were 5 respondents (16.7%).Iron has several essential functions in the body, namely as a means of transporting oxygen from the lungs to body tissues, a means of transporting electrons in cells, and as an integrated part of various enzyme reactions in body tissues (Almatsier, 2009). Iron sources can be obtained easily, nonheme iron sources, such as potatoes, beans, green vegetables (spinach, mustard greens, broccoli, etc.), and iron absorption inhibitors such as tea and coffee. Iron sources derived from beef, liver, poultry, and fish can be absorbed better compared to non-heme iron. Therefore, if iron intake is less and the frequency of consumption of absorption inhibitors (inhibitors) is more frequent than the consumption of iron sources, it can cause low iron levels in the body, and trigger iron deficiency anemia (Adriani, 2012).

Iron deficiency can cause disturbances or obstacles to growth, in both body cells and brain cells,

even iron deficiency sufferers will experience a decrease in endurance, besides that iron deficiency also lowers hemoglobin levels (Linder, 2009). Iron plays an important role in the process of hemoglobin synthesis. Iron is needed for the production of Hb, so anemia due to iron deficiency will lead to the formation of smaller red blood cells and a low Hb content. Iron is also an essential micronutrient in producing Hb which functions to deliver oxygen from the lungs of the body, to be secreted into the respiratory air, cytochrome oxidase, catalase, and peroxidase. Iron plays a role in the synthesis of Hb in red blood cells and myoglobin in muscle cells. The content of ± 0.004 % by weight (60 - 70 %) is found in the Hb stored ferritin in the liver, hemosiderin in the spleen and bone marrow (Zarianis, 2006)

In the analysis of the relationship in this study related to the Hb levels of iron levels of mature milk, it was found that there was a meaningful relationship between the hemoglobin levels of breastfeeding mothers and the iron levels of mature milk, namely with the significance value of p = 0.000 (P<0.05). This can be seen from the results of the examination of several samples with the same pattern, namely the higher the hemoglobin level, the higher the iron level in the milk, and vice versa, the lower the hemoglobin level of eating, the lower the iron level of breast milk. As in the sample code G where the results of the hemoglobin level examination are 11.2 g/dl where this level is below the standard hemoglobin level of an adult woman, namely 12 - 14 g/dl, then judging from the iron level of the milk is 0.32 mg/L which means it is below normal, the normal level of Fe-milk level is 0.5 mg/L. Then in samples H, S, and T also happened the same thing, namely, the results of the examination of hemoglobin levels in a row were 11.4 g/dl; 11.6 d/dl; 11.9 g/dl and the results of the examination of breast milk iron levels were 0.33 mg/L; 0.48 mg/L; 0.50 mg/L. From some of these samples, it can be seen that hemoglobin levels are directly proportional to iron levels in breast milk. Then in the AD and J samples, the hemoglobin levels were the same 12.9 g/dl but the results of the Fe-milk levels were different, namely 0.91 mg/L and 1.76 mg/L. Iron results were very different from the same hemoglobin levels. This can happen because of many factors, such as errors during sampling, as well as when working on samples. Breast milk samples must be taken to the laboratory immediately using a coolbox because breast milk cannot last <2 hours if it is at room temperature. Then in sample code B, the results of hemoglobin levels are 15.5 g / dl and the iron level of breast milk is 1.72 mg/L. This shows that the higher the hemoglobin level, the higher the iron level in breast milk.

Inadequate intake of iron absorption can cause anemia, such as eating foods that have poor iron quality (foods high in fiber, low in vitamin C, low in meat), eating foods that can interfere with iron absorption such as drinking tea and coffee, and consuming junk food that is only a little bit or even some that do not exist at all contain calcium, iron, riboflavin, folic acid, vitamin A, and Vitamin C, while the content of saturated fats, cholesterol and sodium is high. The proportion of fat as a provider of calories is more than

50% of the total calories contained in that food. The type of work will be able to determine the level of income (Arisman, 2010). The level of income also determines the food purchased. The higher the opinion the higher the percentage of shopping purchased including types of groceries such as danging, vegetables, and fruits. Adequate family income will support the child's growth and development because parents can meet the needs of the child. In addition to socioeconomics, the level of education and knowledge of maternal nutrition is also one of the factors that can cause anemia. The level of education and knowledge of maternal nutrition greatly affects the preparation of the family diet and the quality of the substances consumed. The higher the mother's knowledge, the more positive the mother's attitude toward food nutrition so that the better the consumption of energy, protein, and iron in her family. This result is in line with Sholicha's research (2019) which shows a strong relationship between iron intake and hemoglobin levels. The higher the iron intake, the more hemoglobin level will also increase, so it can cause a low incidence of anemia, but this result also contradicts the research conducted by Dwi Ernawati et al in 2019, which stated that there is no significant difference in Fe levels in the breast milk of mothers with mild, moderate, and non-anemia. Some shortcomings are still found in this study, namely the abnormality of the data obtained and the non-conduct of interviews about the lifestyle and nutritional conditions of the respondents.

ACKNOWLEDGMENTS

Thank you the director of the east Kalimantan ministry of health, the head of the medical laboratory technology department, PT Global Environment Laboratory, and those who have helped so that this research can be carried out.

CONCLUSIONS AND SUGGESTIONS

Conclusion

1. The age of Ibu breastfeeding m breast milk is set to be in the range of 19 - 37 years.
2. Hemoglobin levels vary greatly with a range of 11.2 – 15.5 gr/dl
3. Iron (Fe) levels of mature milk vary in the range of 0.32 – 1.92 mg/L
4. There is a relationship between hemoglobin levels and iron (Fe) levels of maturation in nursing mothers shown by a statistic k test that obtains a p-value = 0.000

Suggestion

1. It is hoped that subsequent researchers can increase the number of samples and examine more deeply the factors that affect hemoglobin levels such as maternal nutritional status, disease, and nutritional status of children in other different locations
2. It is expected that breastfeeding mothers will conduct regular health checks to reduce maternal and infant mortality and cases of malnutrition

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