

Analysis of Health Risk Factors in Children Based on Dietary Habit at SDN Cempaka Putih Barat 07 Timur, Central Jakarta

Azizatun Munawaroch¹, Omega DR Tahun²

^{1,2}Sekolah Tinggi Ilmu Kesehatan Abdi Nusantara Jakarta

azizatun123@gmail.com

Abstract

The incidence of anemia is a health problem that occurs evenly throughout the world, especially in developing countries where it is estimated that 30% of the world's population suffers from anemia. Meanwhile, the incidence of anemia in Indonesia reaches 29.0%. The effects of anemia on children include that children tire easily, decrease concentration in learning, are susceptible to infection, decrease in cognitive abilities, and if it occurs in school children it will reduce learning capacity and ability. The purpose of this study was to determine the relationship between diet and the incidence of anemia in school-age children. This type of research is quantitative analytic, cross-sectional design. This research was conducted at SDN Cempaka Putih Barat 07, Central Jakarta in October 2022 - January 2023. The population in this study were all elementary school children, the sample size was 75 respondents. How to take samples using systematic random sampling method. Of all the respondents studied, it was found that there were 22.7% of children who had anemia. The results of the chi square test showed that dietary pattern was related to the incidence of anemia in children, iron intake (p value=0.000; OR=8.8), protein intake (p value=0.049; OR=3.5) and vitamin C intake. (p value=0.033; OR=3.8). The health Center needs to optimize educational programs for elementary school children, parents and teachers about the dangers of anemia in children and efforts to prevent / treat anemia in children.

Keywords

anemia; diet; children; risk factors



I. Introduction

The problem of nutrition in Indonesia is still the government's responsibility, this is because the Indonesian state is experiencing a double burden of various nutritional problems, such as: malnutrition, stunting, obesity and cases of anemia in children. In addition to macro-nutrition problems, Indonesia is still experiencing micro-nutrition problems, one of which is a lack of vitamins and minerals which causes anemia. Anemia occurs due to conditions where the level of hemoglobin (Hb) in the blood is lower than the normal value for the group of people concerned (Putri, et al. 2021).

Anemia is commonly experienced by children aged under five and elementary school age children. Children aged 6 months to 5 years can be said to suffer from iron deficiency anemia if their hemoglobin level is less than 11 g/dl, aged 6-14 years is less than 12 g/dl, adult males are less than 13 g/dl, non-pregnant adult women less than 12 g/dl, and pregnant

adult women less than 11 g/dl. Anemia is a public health problem in the world because the prevalence is still high (Thaslifa, Eka, 2022).

Incident anemia is a health problem that occurs evenly throughout the world, especially developing countries where it is estimated that 30% of the world's population suffers from anemia, this condition causes children to tire quickly, decreases concentration in learning so that spending achievements are low and can reduce work productivity. Anemia is better known by the public as anemia. Globally, there are 2.3 billion people with anemia. Asia and Africa are recorded to have the highest prevalence of anemia, which is 85% experienced by women and children. About 50% of them have iron deficiency anemia (ADB) (World Health Organization, 2020).

The results of a survey conducted by Basic Health Research (Riskesdas) in 2018 revealed that iron deficiency anemia is still a public health problem with a prevalence in children 5-12 years of 29%, the survey showed that the proportion of anemia in the age group 15-24 years as much as 48.9% (Ministry of Health RI, 2018). The proportion of anemia in Indonesia is dominated by girls when compared to boys, and it is more prevalent among children aged 5-14 compared to adolescents aged 15-21 years (Ministry of Health RI, 2018).

The age of children is a period of growth that needs to be considered, because at that age their activities are quite high so that the nutritional intake needs are the same. Thus, the need for nutritional intake must be met and balanced. Children are also part of the young generation, as one of the human resources, which is the potential and successor to the ideals of the nation's struggle, which has a strategic role and has special characteristics and traits (Rizal, 2020). Children are the mandate of God given to parents. For this mandate, Allah obliges every parent to care for, nurture and educate children to become good, smart, noble children and to avoid things that are not good (Hendra, 2019). Family communication always provides the necessary recognition and support from parents to their children (Thariq, 2018). Parents should pay great attention to meeting the nutritional needs of their children. Nutrients are chemical compounds needed by the body to produce energy, build and regulate body processes. The nutrients needed by the body are carbohydrates, proteins, fats, minerals and vitamins. However, vitamins and minerals are micronutrient needs that are often forgotten, especially iron or Fe. Fe is a chemical compound that the body needs in the process of forming red blood cells and helps transport O₂ throughout the body (Goni et al., 2015).

The problem of anemia in elementary school children has become a public health problem that has not been resolved until now. This anemia problem will have an impact on elementary school children. The most obvious impact is the decreased ability to think (reduced concentration and intelligence) and the disruption of physical activity due to the condition of the body that is easily tired. In addition, nutritional anemia can interfere with the response of the immune system, especially T-lymphocyte cells, making it easier to get infectious diseases (Fitriany, Saputri, 2018).

The impact caused by anemia is quite a lot, including anemia can cause a person to be susceptible to infection, decrease cognitive abilities, and if it occurs in school children it will reduce learning capacity and abilities. This is caused by a lack of intake of nutrients, especially iron and other micronutrients that help absorb and metabolize iron, as well as worms. So that a lack of hemoglobin levels in the blood can cause symptoms of weakness, fatigue, lethargy, negligence and fatigue (Almatsier, 2014).

Iron intake is a very important element to form hemoglobin (Hb). In the body, iron has functions related to the transportation, storage and utilization of oxygen and is in the form of hemoglobin, myoglobin, or cytochrome. Apart from food intake, to meet the need for the formation of hemoglobin, most of the iron that comes from the breakdown of red blood cells will be reused.

Anemia is mostly caused by nutritional factors related to vitamin and mineral deficiencies. In addition to these factors, nutritional anemia is also influenced by other factors such as socio-economic, education, diet, health facilities, growth, and infection. The direct causes of anemia are varied, including: deficiency of nutritional intake from food such as iron, folic acid, protein, vitamin C, riboflavin, vitamin A, zinc and vitamin B12, consumption of substances that inhibit iron absorption, infectious diseases, malabsorption, bleeding and increasing needs. Vitamin C is an essential element that the body really needs for the formation of red blood cells. The presence of vitamin C in the food consumed will provide an acidic atmosphere, making it easier to reduce ferric iron to ferrous iron, which is more easily absorbed by the small intestine. The absorption of iron in the non-heme form increases fourfold when there is vitamin C (Almatsier, 2014).

Protein plays an important role in the transportation of iron in the body, therefore a lack of protein intake will result in obstructed iron transportation so that iron deficiency will occur. Transferrin is a glycoprotein that is synthesized in the liver, the protein plays a central role in the body's iron metabolism because the function of transferrin is to transport iron in circulation to places that need iron, such as from the intestine to the bone marrow to form new hemoglobin. Ferritin is another protein that is important in iron metabolism, under normal conditions, ferritin stores iron that can be retrieved for use as needed. The amount of protein absorbed depends on the quality of the protein, the quality of the protein is determined by the type and proportion of amino acids it contains. High-quality protein comes from the animal protein group, apart from having high bioavailability, animal protein such as meat, fish and poultry acts as a Meat Fish Poultry Factor (MFP Factor) which plays a role in increasing the absorption of non-heme iron originating from cereals and plants.

One of the factors that causes anemia due to lack of nutrients is vitamin B complex, where the vitamin consists of 8 water-soluble vitamins and plays an important role in cell metabolism. Folic acid and vitamin B12 are needed in the formation of red blood cells. Folic acid and vitamin B12 are important in the final maturation of red blood cells. Both are important for the synthesis of DNA (Deoxyribonucleic Acid) because each vitamin is required in a different way for the formation of thymidine triphosphate, which is one of the essential building blocks of DNA. Deficiency of vitamin B12 and folic acid can cause abnormalities and reduction of DNA which results in failure of nuclear maturation and cell division (Thaslifa, Eka, 2022).

The impact of malnutrition that causes anemia in school children who are the next generation of the nation needs to be prevented, the nutrition of school children must be maintained, improved and their health protected. Optimal growth and development of school-age children depends on the intake of nutrients of sufficient quality and quantity according to the needs of each individual. At school age children enter a new world where they begin to have a lot of contact with the world outside the family, this affects children's eating habits and causes less variety of nutrients consumed.

The higher a person who has poor nutritional status, the higher the incidence of anemia. Basically, anemia is directly affected by daily consumption of foods that lack iron, apart from infection as a trigger. In general, food consumption is closely related to nutritional status. If the food consumed has good nutritional value, then the nutritional status is also good, conversely if the food consumed has less nutritional value, it will cause malnutrition and can cause anemia.

Based on a preliminary study conducted in the work area of the Cempaka Putih Health Center, one of them is SDN CPT 03 Jakarta. Information was obtained that there were many elementary school children who had anemia. This prompted the researcher to conduct research to find out the relationship between the child's diet and the case, while the aims of

this study were: to know the relationship between nutritional status and the incidence of anemia in school-age children at SDN CPT 03 Jakarta.

II. Research Method

This study only focused on the relationship between diet and the incidence of anemia in children. The independent factors studied were eating patterns which included; intake of iron, protein and vitamin C, while the independent variable is anemia in children. This research was conducted at SDN Cempaka Putih Barat 07, Central Jakarta in October 2022 - January 2023. This type of research is an analytical quantitative, cross-sectional design. The population in this study were all children of SDN Cempaka Putih Barat 07, the number of samples was calculated using the formula. How to take samples using systematic random sampling method.

III. Discussion

3.1 Results

a. Univariate Analysis

Table 1. Frequency Distribution of Respondents According to Dependent and Independent Variables

Variable	Category	Amount	Percentage
Anemia events	Yes	17	22,7
	Not	58	77,3
Iron intake	Not enough	21	28.0
	Enough	54	72.0
Protein intake	Not enough	23	30,7
	Enough	52	69,3
Vitamin C intake	Not enough	22	29,3
	Enough	53	70,7

Source: SPSS Output 2023

Based on table 1 regarding the frequency of respondents according to the incidence of anemia, iron intake, protein intake and vitamin C intake shows that: first, of the 75 respondents studied it was found that there were 22.7% of respondents who had anemia and 77.3% of respondents who did not have anemia. Second, it shows that of all the respondents studied, the majority of children's nutritional intake was adequate, namely 72.0% and 28.0% of respondents whose intake was insufficient. Third, of the total respondents according to protein intake, it was found that there were 30.7% of respondents whose intake was insufficient and 69.3% sufficient. Fourth, of all the respondents whose intake of vitamin C was examined, it was found that 29.3% had insufficient intake and 70.7% had sufficient intake.

b. Bivariate Analysis

1. Relationship Between Iron Intake and Anemia Incidence

Table 2. The Relationship Between Iron Intake and the Incidence of Anemia in Elementary School Students at SDN 07 Cempaka Putih Barat in 2022

Iron Intake	Anemia Incidence		Total N (%)	P-value	OR (95% CI)
	Yes	Not			
	n(%)	n(%)			
Not enough	11 (52.4)	10 (47.6)	21 (100.0)	0.000	8,800 (2.6-29.3)
Enough	6 (11,1)	48 (88.9)	54 (100.0)		
Amount	17 (22.7)	58 (77.3)	75 (100.0)		

Based on table 2 regarding the distribution of the incidence of anemia in elementary school children according to iron intake, it was found that of the 21 respondents who were interviewed and had insufficient iron intake, it was found that most of them had anemia, namely 52.4% and 47.6% who did not experience anemia. anemia. Meanwhile, of the 54 respondents who said their intake of iron was sufficient, only 11.1% of respondents experienced anemia and the majority did not experience anemia.

The results of the "chi square test" statistic test obtained a value of $p = 0.000$ (p value $< \alpha 0.05$). The decision was that H_0 was rejected and H_a was accepted, meaning that there was a significant relationship between iron intake and the incidence of anemia. The conclusion is that there is a difference in the incidence of anemia between those who say their iron intake is insufficient and sufficient. The statistical test results showed the value of $OR = 8.800$ (rounded to 9), meaning that respondents whose iron intake was low had a 9 times greater chance of experiencing anemia compared to respondents whose iron intake was sufficient.

2. Relationship between Protein Intake and Anemia Incidence

Table 3. The Relationship Between Protein Intake and Anemia Incidence in Elementary School Students at SDN 07 Cempaka Putih Barat in 2022

Protein intake	Anemia Incidence		Total N (%)	P-value	OR (95% CI)
	Yes	Not			
	n(%)	n(%)			
Not enough	9 (39.1)	14 (60.9)	23 (100.0)	0.049	3,536 (1.1-10.9)
Enough	8 (15,4)	44 (84.6)	52 (100.0)		
Amount	17 (22.7)	58 (77.3)	75 (100.0)		

Based on table 3 regarding the distribution of the incidence of anemia in elementary school children according to protein intake, it was found that of the 23 respondents whose protein intake was insufficient, 39.1% had anemia. Meanwhile, of the 52 respondents who had sufficient protein intake, it was found that 15.4% of respondents experienced anemia and the majority did not experience anemia, namely 84.6%.

The results of the statistical test "chi square test" obtained a value of $p = 0.049$ (p value $< \alpha 0.05$). The decision was that H_0 was rejected and H_a was accepted, meaning that there was a significant relationship between protein intake and the incidence of anemia. The conclusion is that there is a difference in the incidence of anemia between those who say their protein intake is insufficient and sufficient. Statistical test results showed $OR = 8.800$ (rounded to 9), meaning that respondents whose protein intake was low had a 9 times greater chance of experiencing anemia compared to respondents whose protein intake was sufficient.

3. Relationship between Vitamin C Intake and Anemia Incidence

Table 4. The Relationship Between Vitamin C Intake and the Incidence of Anemia in Elementary School Students at SDN 07 Cempaka Putih Barat in 2022

Vitamin C intake	Anemia Incidence		Total	P-value	OR (95% CI)
	Yes	Not			
	n(%)	n(%)	N (%)		
Not enough	9 (40.9)	13 (59.1)	22 (100.0)	0.033	3,894 (1.2-12.1)
Enough	8 (15,1)	45 (84.9)	53 (100.0)		
Amount	17 (22.7)	58 (77.3)	75 (100.0)		

Based on table 5.4 regarding the distribution of the incidence of anemia in elementary school children according to vitamin C intake, it was found that of the 22 respondents whose intake of vitamin C was insufficient, 40.9% had anemia. Meanwhile, of the 53 respondents whose intake of vitamin C was sufficient, it was found that 15.1% of respondents experienced anemia and the majority did not experience anemia, namely 84.9%.

The results of the statistical test "chi square test" obtained a value of $p = 0.033$ (p value $< \alpha 0.05$). The decision was that H_0 was rejected and H_a was accepted, meaning that there was a significant relationship between vitamin C intake and the incidence of anemia. The conclusion is that there is a difference in the incidence of anemia between those with insufficient and sufficient intake of vitamin C in the body. Statistical test results showed $OR = 3.894$ (rounded to 4), meaning that respondents whose intake of vitamin C was low had a 4 times greater chance of experiencing anemia compared to respondents whose intake of vitamin C was sufficient.

3.2 Discussion

a. The Relationship Between Iron Intake with the Incidence of Anemia in Elementary School Children

The results of the statistical test "chi square test" obtained a value of $p = 0.000$ (p value $< \alpha 0.05$), meaning that there is a significant relationship between iron intake and the incidence of anemia. And the results of this analysis also confirmed that respondents whose

intake of iron in their body was low had a 9 times greater chance of experiencing anemia compared to respondents whose iron intake was sufficient.

The results of this study are in line with research conducted by Nurdiniyah and Melis (2021) that iron intake has an effect on the incidence of anemia in children (p value <0.05). Furthermore, research by Mulyaningsih et al (2019) states that the factors that influence the occurrence of anemia are diet, a diet that is low in iron can cause anemia. And in research Sholicha & Muniroh (2019) also stated that there is a relationship between iron intake and hemoglobin levels.

On the basis of the above studies, the researchers argue that every child has the same risk of developing anemia, therefore nutritional intake in children must be considered. Parents have a big role in regulating children's diet, so that every food that is prepared, served and consumed by children must contain various vitamins and minerals to meet children's nutritional needs, such as iron and others. Children do not understand the types of foods that contain lots of iron, therefore parents must teach their children to frequently consume foods that contain high iron.

b. Relationship Between Protein Intake with Anemia Incidence in Elementary School Children

The results of the statistical test "chi square test" obtained a value of $p = 0.049$ (p value $<\alpha 0.05$), meaning that there is a significant relationship between protein intake and the incidence of anemia. The results of this study also confirmed that respondents whose protein intake was low had a 9 times greater chance of experiencing anemia compared to respondents whose protein intake was sufficient.

The results of this study are in line with research conducted by Nurdiniyah and Melis (2021) that protein intake has an effect on the incidence of anemia in children (p value <0.05). Furthermore, research by Mulyaningsih et al (2019) also revealed that the factors that influence the occurrence of anemia are diets that contain protein.

Protein is useful for distributing iron in the body, therefore a lack of protein intake will result in hampered iron transportation so that iron deficiency will occur. Transferrin itself is a glycoprotein that is synthesized in the liver, the protein plays a central role in the body's iron metabolism because the function of transferrin is to transport iron in circulation to places that need iron, such as from the intestine to the bone marrow to form new hemoglobin.

According to Antono et al (2020) explains that setting a pattern is very important, because a good diet is a frequency of eating up to 2-3 times a day, and 1 meal as a distraction and consuming a variety of foods (eating staple foods, vegetable side dishes, animal side dishes, vegetables and fruit) in one day can support growth, development and improve health standards until entering adolescence.

On the basis of the above studies, according to the researcher, to prevent the occurrence of anemia, a diet high in protein must be a priority in meeting the nutritional needs of children. Each food consumed by children must be varied, parents play a role in regulating the child's diet so that each type of food eaten meets the desired nutritional standards.

c. The Relationship Between Vitamin C Intake with the Incidence of Anemia in Elementary School Children

The results of the statistical test "chi square test" obtained a value of $p = 0.033$ (p value $<\alpha 0.05$), meaning that there is a significant relationship between vitamin C intake and the incidence of anemia. Even respondents whose intake of vitamin C in their body was low

had a 4 times greater chance of experiencing anemia compared to respondents whose intake of vitamin C was sufficient.

The results of this study are in line with research conducted by Oktavia and Reni (2022) which shows that there is a relationship between intake of vitamin C consumption and the incidence of anemia, respondents whose consumption of vitamin C is low tends to experience anemia compared to respondents who consume sufficient vitamin C. Furthermore, research by Waluyo and Daud (2022) also revealed that there is a relationship between eating habits and the incidence of anemia. Eating habits are focused on the need for nutrients that are sourced in producing iron. Iron needed / needed in a day is it less, moderate or sufficient.

Vitamin C is an essential element that the body really needs for the formation of red blood cells. Vitamin C inhibits the formation of hemosiderin which is difficult to mobilize to liberate iron when needed. The presence of vitamin C in the food consumed will provide an acidic atmosphere, making it easier to reduce ferric iron to ferrous iron, which is more easily absorbed by the small intestine. The absorption of iron in the non-heme form increases fourfold when vitamin C is present.

According to the researchers, children as a vulnerable group for anemia need attention. A diet that is high in iron, protein and vitamin C must be optimized, so that every child gets adequate nutrition for his body. The impact of anemia on elementary school students is that it can cause physical growth disorders, low resistance to disease, less intelligence than it should be, low learning/work achievement and sports achievement. In addition, anemia in children will have an impact on decreasing the ability and concentration in learning, disrupting the growth of both body cells and brain cells, causing symptoms to appear pale, tired, lethargic and tired quickly so that it can reduce fitness and learning achievement.

IV. Conclusion

Based on the results of this study, it can be concluded several things as follows:

1. The 75 respondents studied, it was found that 22.7% of the children at SDN 07 Cempaka Putih had anemia, while most of them did not, namely 77.3%.
2. There is a relationship between iron intake and the incidence of anemia in children at SDN 07 Cempaka Putih (p value = 0.000; OR = 8.8).
3. There is a relationship between protein intake and the incidence of anemia in children at SDN 07 Cempaka Putih (p value = 0.049; OR = 3.5).
4. There is a relationship between vitamin C intake and the incidence of anemia in children at SDN 07 Cempaka Putih (p value = 0.033; OR = 3.8).

References

- Almatsier, S. (2010). Prinsip Dasar Ilmu Gizi. Gramedia Pustaka Utama.
- Antono, S. D., Setyarini, A. I., & Mar'ah, M. (2020). Pola Makan Pada Remaja Berhubungan Dengan Kejadian Anemia Pada Siswi Kelas VII. Jurnal Ilmiah Permas: Jurnal Ilmiah STIKES Kendal, 10(2).
- Fitriany J, Saputri AI. Anemia defisiensi besi. Averrous. 2018;4(2):1. doi:10.29103/averrous.v4i2.1033
- Goni DMM, Kapantow N, Sondakh R. Hubungan antara asupan zat besi (fe) dengan kadar hemoglobin (hb) pada anak usia 1-3 tahun di wilayah kerja puskesmas ranomut kota manado. Published online 2015.

- Hendra, Y., and Priadi, R. (2019). Family Communication Model in Forming Pious Children. Budapest International Research and Critics Institute-Journal (BIRCI-Journal) Vol 2 (1): 28-38.
- Mulyaningsih, Sukarni, Kadir. Hubungan Pola Makan Dengan Kejadian Anemia Pada Ibu Hamil di Wilayah Kerja Puskesmas Limboto. Madu Jurnal Kesehatan. ISSN: 2301-5683
- Nurdiniyah, Melis (2021) *Faktor Penyebab dan Determinan Anemia pada Anak Sekolah*. Diploma thesis, STIKes BTH Tasikmalaya.
- Oktavia, Reni (2022) *Hubungan Kebiasaan Sarapan, Tingkat Kecukupan Zat Besi, Vitamin C, dan Tembaga (Cu) dengan Kejadian Anemia Remaja Putri*. Undergraduate thesis, Politeknik Negeri Jember.
- Pratiwi EE, Sofiana L. Kecacingan sebagai Faktor Risiko Kejadian Anemia pada Anak. JKMI. 2019;14(2):1. doi:10.26714/jkmi.14.2.2019.1-6
- Putri NM, Briawan D, Baliwati YF. Faktor Risiko Anemia pada Anak Sekolah Dasar di Temanggung. IJHN. 2021;8(1):33. doi: 10.21776/ub.ijhn.2021.008.01.4
- Kemenkes RI. (2018). Hasil Utama Riset Kesehatan Dasar (RISKESDAS). Journal of Physics A: Mathematical and Theoretical, 44(8), 1–200
- Rizal, M., and Djannah, F. (2020). Impact of Violence against Children in the Family Related To Law Number 23 Year 2004 Concerning Deletion of Violence in Household. Budapest International Research and Critics Institute-Journal (BIRCI-Journal) Vol 3 (1): 348-358.
- Sirajuddin S, Masni M. Kejadian Anemia pada Siswa Sekolah Dasar. Kesmas: National Public Health Journal. 2015;9(3):264. doi:10.21109/kesmas.v9i3.574.
- Sholicha, C. A., & Muniroh, L. (2019). Hubungan Asupan Zat Besi, Protein, Vitamin C dan Pola Menstruasi dengan Kadar Hemoglobin Pada Remaja Putri di SMAN 1 Manyar Gresik. Media Gizi Indonesia, 14(2), 147. <https://doi.org/10.20473/mgi.v14i2.147-153>
- Thariq, M. (2018). Interpersonal Communication Role for Self- Concept of Children and Families. Budapest International Research and Critics Institute-Journal (BIRCI-Journal) Vol I (2): 182-195.
- Thaslifa, Eka. Analisa Kejadian Anemia Defisiensi Besi Pada Anak Usia Dini Berdasarkan Formula Indeks Mentzer. Journal Of Health, Education and Literacy, 2022 4(2) e-issn: 2621-9301, p-issn: 2714-7827.
- Waluyo, D., & Daud, A. C. (2022). Hubungan Kebiasaan Makan dengan Kejadian Anemia pada Remaja Putri di Desa Poowo Barat Kabupaten Bone Bolango. *Gema Wiralodra*, 13(1), 34–42. <https://doi.org/10.31943/gemawiralodra.v13i1.221>