Hemoglobin Level Examination in Students of Panrita Husada Bulukumba Health College Who Consume Instant Noodles

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Abstract

Hemoglobin is an iron-rich protein in red blood cells responsible for oxygen transport from the lungs to body tissues. Iron, along with vitamin B12 and folic acid, is essential for hemoglobin formation, with iron being a key component in heme production. Consuming instant noodles more than twice a week can increase the risk of metabolic disorders, such as obesity, high blood pressure, elevated blood sugar, and cholesterol. This study aimed to assess the hemoglobin levels of STIKES Panrita Husada Bulukumba students who consume instant noodles regularly. A descriptive cross-sectional quantitative study was conducted with 25 respondents. The results revealed a range of hemoglobin levels, with a low value of 8.0 g/dl, a normal value of 13.1 g/dl, and a high value of 16.1 g/dl, with a standard deviation of 2.04. The study found significant variation in hemoglobin levels among the students, with some indicating potential anemia and others suggesting polycythemia. This supports previous studies linking regular instant noodle consumption to malnutrition, particularly iron deficiency anemia.

Keywords: Hemoglobin, iron deficiency, instant noodle, nutritional impact

1. Introduction

Hemoglobin is an iron-rich protein found in red blood cells that plays a crucial role in transporting oxygen from the lungs to body tissues, while also giving blood its red color (Wati et al., 2023). The formation of hemoglobin requires essential components, including iron (Fe), vitamin B12, and folic acid, with iron being the primary element in heme synthesis (Welkriana & Laksono Heru, 2021).

According to the 2018 Riskesdas report, 26.8% of children aged 5–14 years were found to suffer from anemia, with the prevalence increasing to 32% in the 15–24 year age group (Putri et al., 2021). In South Sulawesi, the prevalence of anemia among adolescent girls over 15 years old is reported to be 10.3%. Data from the South Sulawesi Provincial Health Office indicates that 33.7% of adolescent girls are affected by anemia (Health Office, 2018). In Bulukumba Regency, screening of 572 adolescents in 2023 revealed approximately 362 cases of anemia.

The consumption of instant noodles more than twice a week has been linked to an increased risk of metabolic disorders, such as obesity, high blood pressure, elevated blood sugar levels, and cholesterol. Research shows that frequent instant noodle consumption correlates with poorer dietary quality and a higher risk of metabolic syndrome and cardiovascular diseases (Shin et al., 2014). Moreover, individuals consuming instant noodles tend to have lower intake levels of essential nutrients like protein, calcium, phosphorus, iron,

potassium, vitamin A, niacin, and vitamin C. This is further exacerbated by the discovery of benzopyrene, a carcinogenic substance, in several instant noodle brands (Lestari, 2016).

Monosodium glutamate (MSG), commonly used as a flavor enhancer in instant noodles, has also been associated with health issues. High MSG consumption may lead to brain dysfunction and damage to various organs, potentially contributing to diseases such as Alzheimer's, Parkinson's, and learning disabilities (Lestari, 2016). Although some studies have suggested links between MSG consumption and health problems, the evidence remains mixed, and further research is required to fully understand its impact.

Iron deficiency anemia is one of the most common forms of anemia, particularly among adolescent girls. Iron deficiency hinders hemoglobin production, reducing the blood's capacity to transport oxygen throughout the body. Common symptoms of anemia include fatigue, weakness, shortness of breath, and pale skin (World Health Organization, 2021). Risk factors for anemia in adolescent girls include heavy menstrual bleeding, inadequate iron intake, and increased iron requirements during periods of growth.

Adequate iron intake is essential to prevent anemia. Heme iron, found in red meat, poultry, and fish, is more readily absorbed by the body compared to non-heme iron, which is present in leafy green vegetables, legumes, and grains. The absorption of non-heme iron can be enhanced by consuming vitamin C-rich foods (National Institutes of Health, 2021). It is crucial for adolescent girls to consume iron-rich foods and consider supplementation if necessary, especially for those at high risk of anemia.

In addition to iron, vitamin B12 and folic acid are critical for the production of red blood cells. A deficiency in vitamin B12 can lead to megaloblastic anemia, characterized by the production of large, immature red blood cells. Vitamin B12 sources include animal products like meat, fish, eggs, and dairy, while folic acid is abundant in leafy green vegetables, fruits, legumes, and grains (National Institutes of Health, 2021). Sufficient intake of these nutrients is vital for preventing anemia and maintaining healthy blood function.

Excessive consumption of instant noodles may contribute to deficiencies in essential nutrients such as iron, vitamin B12, and folic acid. Instant noodles typically have low levels of these nutrients while being high in sodium and saturated fats, which can adversely affect health if consumed excessively (Healthline, 2021). Limiting instant noodle consumption and ensuring a balanced diet rich in fruits, vegetables, lean proteins, and whole grains are important for maintaining overall health.

Nutritional education and increased awareness of the importance of adequate nutrient intake are vital in preventing anemia among adolescent girls. Intervention programs involving schools, communities, and healthcare providers can help improve knowledge and promote healthy dietary practices. Additionally, regular screening for anemia and providing iron supplementation can be effective strategies for reducing the prevalence of anemia in this population (World Health Organization, 2021).

Overall, anemia in adolescent girls remains a significant public health issue requiring focused attention. Factors such as inadequate nutrient intake, excessive instant noodle consumption, and lack of awareness about balanced nutrition contribute to the high prevalence of anemia. Collaborative efforts from individuals, families, communities, and governments are essential to address this issue through nutritional education, dietary interventions, and comprehensive health programs.

Reduced hemoglobin levels in the blood or disruption in the formation of red blood cells in the body. Significant reduction in red blood cells due to excessive bleeding or destruction of red blood cells. The second cause is influenced by the formation of hemoglobin in the blood due to the effects of widespread malignancies such as cancer, radiation, drugs, toxic substances such as chronic diseases involving kidney and liver disorders, inflation, endocrine hormone deficiency (Syadzila et al., 2019).

In addition to low hemoglobin, high hemoglobin (Hb) can also cause health problems, both mild and conditions that require medical treatment. High Hb can be caused by various factors. The cause of high hemoglobin levels most often occurs when the body needs an increase in oxygen-carrying capacity, this can be due to blood clotting, heart problems, smokers, lung disease, taking certain medications, and living in the highlands (Nur Sri Atik, 2022).

Anemia is defined as a disorder in which the body produces fewer red blood cells due to iron deficiency. The nutrient needed for hemoglobin production is iron. Anemia is a condition in which the hemoglobin (Hb) level in the blood is lower than normal. Lack of hemoglobin levels in the blood can cause symptoms of lethargy, weakness, fatigue, tiredness, and forgetfulness. In addition, iron deficiency anemia will reduce the body's resistance and make it susceptible to infection (Suryani, 2023).

Polycythemia or erythrocytes is an increase in the number of red blood cells in circulation. The increase in hematocrit values persists for >2 months. The incidence of polycythemia (primary and secondary) is currently difficult to calculate. It is estimated that half of secondary polycythemia cases are due to non-hematological disorders. Meanwhile, the incidence of primary/vera polycythemia is 1.9 per 100,000 people (Cahyanur 2019).

A person's hemoglobin level can be lower or higher than normal because it is influenced by several factors. Factors that affect hemoglobin levels in red blood cells (erythrocytes) in a person are food, age, gender, physical activity, smoking, and accompanying diseases such as leukemia, thalassemia, and tuberculosis. One of the factors that affects hemoglobin levels is food, foods high in cholesterol can disrupt the quality of hemoglobin (Dwi Aridya et al., 2023).

Nowadays, the trend of eating instant noodles greatly affects health. These instant noodles are very rich in carbohydrates, but the levels of vitamins and minerals are very low. The dry form is also the result of frying which will produce trans fat which can cause coronary heart disease because this trans fat plays a role in increasing LDL cholesterol (bad cholesterol). In addition, for those who like to eat instant noodles with soup, did you know that this food contains more MSG (Mono Sodium Glutamate) and sodium which are very bad for your health (Difha, 2020).

One of the foods that affect health is instant noodles. Instant noodles are a favorite food in all levels of society, from children to adults. However, instant noodles cannot be considered a complete food because they do not meet the body's balanced nutritional needs. These noodles are made from wheat containing large amounts of carbohydrates, but the content of protein, vitamins, iron, and minerals is only small. Fulfillment of instant noodle nutrition can be obtained if there are additional vegetables and protein sources (Welkriana, 2021).

Previous research conducted by Febriana in 2017 entitled Hemoglobin Levels in Students Who Consume Instant Noodles. Based on the results of the study, it showed that

most respondents had low hemoglobin levels, namely (57.6%), and almost half of the respondents consumed instant noodles in one week, an average of 3 packs, namely (33.3%) (Febriana, 2017). About the description above, the researcher is interested in conducting a study entitled "Examination of Hemoglobin Levels in Students of STIKES Panrita Husada Bulukumba Who Consume Instant Noodles.

2. Methods

This study is a type of quantitative research with a descriptive cross-sectional research design to determine the analysis of hemoglobin levels in STIKES Panrita Husada Bulukumba students who consume instant noodles. Patient preparation, Tools, Hemoglobin level measuring tool (nesco), auto click.

Materials: 70% alcohol cotton, lancet, capillary blood, handscoon, hemoglobin strip

- Prepare the tools and materials to be used.
- Install the hemoglobin strip on the Nesco and the device will turn on.
- Select one finger (ring finger and middle finger) then wipe/sterilize the tip of the finger using 70% alcohol cotton and wait until dry.
- Prick the tip of the finger using a sterile lancet.
- Wipe the first drop of blood with dry cotton and drip the next drop onto the hemoglobin strip that has been inserted into the hemoglobin device.
- Read the examination results displayed on the hemoglobin device screen.
- Record the results.

2.1. Data Management

a) Data editing (editing)

Editing is checking or correcting data that has been collected. Editing is done because the incoming data (row data) may not meet the requirements or not in accordance with the needs. Data editing is done to complete deficiencies or eliminate errors in the raw data.

b) Data Coding and Transformation

Data coding is the assignment of certain codes to each data, including assigning categories to the same type of data.

The code used is as follows:

1. Respondent number

Respondent 1 Code 1

Respondent 2 Code 2

Respondent n Code n

2. Amount of instant noodle consumption

3 packs per week Code 1

3 - 4 per week Code 2

> 4 per week Code 3

c) Tabulating

Tabulating is the process of placing in a table form by creating a table containing data according to the analysis needs. The table created should be able to summarize all the data to be analyzed.

2.2. Data Analysis

After the data has been collected, it is necessary to recheck the completeness of the respondent's identity, the completess of the data (instrument contents) and check the type of data content, then tabulate the research variable data, then continue with statistical data analysis.

3. Results and Discussion

This research was conducted at the Clinical Pathology Laboratory of STIKES Panrita Husada Bulukumba on June 12, 2024, with the aim of the research To examine hemoglobin levels in STIKES Panrita Husada Bulukumba students who consume instant noodles. The results obtained are as follows.

Table 1. Respondent characteristics based on age

Age	Frequency	Percentage
19	3	12%
20	5	20%
21	10	40%
22	4	16%
23	3	12%
Total	25	100%

Source: Primary data, 2024

Based on table 1, it shows that of the 25 respondents, the largest percentage was at the age of 21 years, namely 10 people with a percentage of (40%).

Table 2. Respondent characteristics based on gender

Gender	Frequency	Percentage
Man	4	16%
Woman	21	84%
Total	25	100%

Source: Primary data 2024

Based on table 2, the percentage of the 25 largest respondents is female, namely 21 respondents with a percentage of (84%).

Table 3. Frequency Distribution of Respondents Based on Time of Consuming Instant Noodles among Students of Panrita Husada Bulukumba Health College

No	Time to consume	Frequency	percentage
1	Only at breakfast	5	20.%
2	At lunch time	6	24.0%
3	At night	4	16.0%
4	At all times	10	40.0%
	Amount	25	100%

Source: Primary data 2024

Based on table 3, shows that almost half of the respondents consume instant noodles at any time, namely 10 people with a percentage of (40.0%).

Table 4. The results of the hemoglobin level examination of students at Panrita Husada Bulukumba Health College

NO	Code sample	Hemoglobin Examination Results	Time to consume instant noodles
1	AR	11.0 g/d	At all times
2	FZ	8.0 g/d	At Night
3	ASR	9.3 g/d	At Night
4	SAA	13.0 g/dl	At Night
5	TW	12.6 g/dl	At all times
6	W.S.	14.4 g/dl	At all times
7	NF	11.0 g/dl	At Lunch
8	AMC	14.6 g/dl	At all times
9	UH	13.4 g/dl	At Breakfast
10	PA	15.1 g/dl	At Lunch
11	FT	14.7 g/dl	At Breakfast
12	SS	15.5 g/dl	At all times
13	WA	12.6 g/dl	At Breakfast
14	AFY	13.3 g/dl	At Breakfast
15	HF	14.8 g/dl	At Breakfast
16	FGA	11.5 g/dl	At all times
17	AAE	14.7 g/dl	At all times
18	RR	15.7 g/dl	At all times
19	CU	13.5 g/dl	At all times
20	SD	16.1 g/dl	At lunch time
21	A A	11.7 g/dl	At lunch time
22	JS	10.8 g/dl	At all times
23	RA	12.4 g/dl	At Night
24	SM	16.6 g/dl	At Lunch
25	AHA	13.4 g/dl	At Lunch

Source: Primary data 2024

Based on table 4, it can be seen that of the 25 respondents who obtained low and high values, the low hemoglobin level examination had a value of 8.0 g/dl. students who consume 3 times per week only at night, with a normal value of 13.100 g/dl who consume 3 times per week at any time, and a high value of 16.1 g/dl who consume 3 times per week at lunch.

This study was conducted on June 12, 2024, to determine hemoglobin levels in STIKES Panrita Husada Bulukumba students who consumed instant noodles. This study was conducted by distributing questionnaires to students of STIKES Panrita Husada Bulukumba and obtained 25 students who were willing to be research respondents. Measurement of hemoglobin (Hb) levels using the POCT method, which is done through examination of blood samples placed on the Hb strip, then the Hb strip is inserted into the Hb check tool, then the Hb level value will automatically be detected on the tool.

In the results of this study, there were 25 respondents that the hemoglobin level examination had a very low value of 8.0 g/dl, while the normal value was found in the hemoglobin level examination of 13.100 g/dl, and the high value obtained in the hemoglobin level examination was 16.1 g/dl, with a standard deviation of 2.04. In previous research conducted(Febriana, 2017)shows that some respondents have low hemoglobin levels, namely (57.6%), and almost half of the respondents consume instant noodles in one week, an average of 3 packs, namely (33.3%).

As for low hemoglobin levels, or anemia, can be caused by various factors, namely iron deficiency can be caused by low iron food intake, chronic blood loss, or impaired iron absorption. Lack of vitamin B12 and folate is also important for the formation of red blood cells which can be caused by an unbalanced diet, pernicious anemia, or celiac disease, large blood loss such as due to accidents, surgery, or menstruation can cause acute anemia, as well as general symptoms of anemia are fatigue, pale, shortness of breath dizziness headache, heart palpitations and hair loss.

High hemoglobin levels, or polycythemia, can be caused by several factors, including High hemoglobin levels, or polycythemia, can be caused by several factors, including Dehydration can cause blood volume to decrease, increasing the concentration of hemoglobin in the blood. Living in highlands At highlands, oxygen levels in the air are lower. The body reacts by producing more red blood cells and hemoglobin to carry more oxygen. Kidney disease. The kidneys produce the hormone erythropoietin, which stimulates the production of red blood cells. In kidney disease, the kidneys can produce too much erythropoietin, causing increased production of red blood cells and hemoglobin. Some blood diseases, such as chronic myeloid leukemia and polycythemia vera, can cause increased production of red blood cells and hemoglobin, drugs, such as steroids and epoetin, can increase the production of red blood cells and hemoglobin, with various symptoms such as dizziness, headache, itching. redness of the face, increased blood pressure, bleeding, and swelling of the spleen.

Maybe because at night, he might eat and go straight to sleep so the metabolism process doesn't occur, only fat accumulates and is deposited in the digestive tract and of course, it is dangerous for health because it can trigger dangerous diseases such as heart, kidney, and even cancer.

Hemoglobin is a type of globular protein composed of heme and globin groups. Heme and globin are monomers of amino acids, amino acids are produced from proteins. Lack of protein intake disrupts the anabolism process and inhibits the synthesis of new hemoglobin.

Protein plays an important role in transporting iron in the body. Lack of protein in the diet causes inhibition of iron transport, resulting in iron deficiency.(Anggeriani et al., 2022).

Changes in lifestyle Today's society also affects consumption patterns with the rise of instant foods. Instant or ready-to-serve foods are increasingly popular as a substitute for rice. One of them is instant noodles which are now widely circulated, especially among teenagers as a popular food. In this consumption pattern, it is possible because noodles can be processed easily, and served practically and the community, both adults and children. Noodles with various types of products sizes with affordable prices in various places make new noodle products quickly known by the community(Welkriana, & Laksono Heru, 2021).

Conclusion

Based on a study conducted on June 12, 2024, in 25 students of STIKES Panrita Husada Bulukumba, significant variations in hemoglobin levels were found. Some students showed levels below the normal range, indicating potential anemia, while others had levels above the normal range, indicating polycythemia. This finding is in line with previous studies linking regular consumption of instant noodles with malnutrition, especially iron-defined anemia.

Conflict of Interest

The authors declare no competing interests

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