

Protein and Iron Intake Among Female Adolescents in SMP Negeri 10 in Gorontalo City

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Abstract: Female adolescents are prone to anaemia. This situation can be caused most of them consume more vegetables than meat. The consideration behind such a diet is the desire to be slim. However, a diet like this will put the menstrual cycle at risk, and the excretion of iron through faeces. This study aims to determine the intake of protein and iron in adolescent girls at SMP Negeri 10 Kota Gorontalo. This survey research used a descriptive method. All data were collected using a 24-hour recall form which was distributed to all young women at the study location. This research was conducted in October 2019. A total of 60 students were selected as samples. The results showed that protein intake in young women was in the very low category. Meanwhile, the iron intake in adolescent girls was in the low category. Overall, the study participants' protein and iron intake were low.

Keywords: *protein; iron; female adolescents; anaemia*

1. Introduction

Adolescence refers to the process of developing from a child into an adult. This process begins at the age of 9 to 10 years and ends at 18 years. Growth, specifically physical development, spurs rapidly during this period; thus, one needs high energy and nutrient intakes for such a process. Adequate nutrient intake during adolescence can help optimize growth (Khatimah, 2017).

Kusharto et.al (2014) contends that female adolescents are at a higher risk for anaemia since most of them consume more vegetables rather than meats (Kusharto and Supriasa, 2014). The teenagers' diet preferences are motivated by several reasons, i.e., having a better body, menstrual cycle, and excretion of iron through faeces (Khatimah, 2017).

According to recommended dietary allowances 2019, the recommended protein intake varies for female adolescents with different age ranges. For those aged 10 to 12 years and aged 13 to 15 years, the intake is 60g and 69g, respectively. For those in the final stage of adolescence, i.e., aged 16 to 18 years, the recommended protein intake is 59g. The recommended iron intakes for female adolescents are 20g for those aged 10 to 12

years and 26g for those aged 13 to 18 years (Menteri Kesehatan Republik Indonesia, 2019). Data of Basic Health Research reported that the anaemia prevalence in Indonesia was 23.7%. Based on the age group, the percentages of patients with anaemia were 26.8% (5 to 14 years) and 32% (15 to 24 years) (Badan Penelitian dan Pengembangan Kesehatan, 2019). The research revealed that more female suffered from anaemia than male (Badan Penelitian dan Pengembangan Kesehatan, 2019). Women, particularly in their adolescence, are more likely to experience anaemia due to lack of nutritious intake and menstrual cycle (Martini, 2015).

Lewa (2016) finds that the anaemia prevalence among female students of An-Nuroniayah Vocational High School correlated with the protein intake (Lewa, 2016). This notion resonates with the one seen in research conducted by Sari et.al (2016) which revealed that protein is central to iron transportation in human bodies to develop red blood cells in bone marrows. Low protein intakes hinder the transportation process, thus hampering red blood cell production (Sari, Dardjito and Anandari, 2016). Central to the absorption of iron is protein intake, as this nutrient cooperates with the protein chain in transporting electrons, which plays a significant role in energy metabolism. Another point worth considering is a sufficient vitamin C for teenagers since the vitamin serves as a reducing agent. On that ground, the iron (Fe) in the intestine will be preserved in the form of active iron in the body, allowing the absorption of the iron (Choiriyah, 2015).

This research aims to explore protein and iron intake among female adolescents in SMP 10 state junior high school in Gorontalo City.

2. Materials and Methods

2.1 Material

The research instruments comprised a 24-h recall form and picture books about food; the book provided an overview regarding protein and iron intake for the female students at the research site. Data about intake of protein and iron were obtained by using 24-h food recalls method with three replications.

2.2 Methods

This research employed a descriptive survey design to identify protein and iron intake among female adolescents in SMP 10 state junior high school in Gorontalo City. The study was conducted at SMP 10 State Junior High School in Gorontalo City, October 2019.

The research sample involved 60 students of SMP 10 state junior high school in Gorontalo. The sample size was determined using the formula below.

$$n = \frac{N}{1 + N d^2} = \frac{150}{1 + 150 \times 0,01} = \frac{150}{2,5} = 60$$

Description:

n: Sample size

N: Population size

d: Confidence level at 10%

The criteria of the sampling are as follows:

- a. Inclusion Criteria
 1. All students or samples should be 13 to 18 years old.
 2. All students or samples are willing to participate in the research.
 3. All students or samples should be at the research site at the moment of conducting the study.
- b. Exclusion Criteria
 1. All students or samples are below 13 years old or above 18 years old.
 2. All students or samples are not willing to participate in the research.
 3. All students or samples are not at the research site at the moment of conducting the study.

The present study employed a univariate analysis (descriptive analysis). In general, these analysis results are in the form of a frequency distribution table or a percentage of each research variable.

3. Results

3.1 Protein intake

Protein as one of macro nutrients plays important role in human body. It involves in every cells' activities including structure, function and regulation of tissues and organs (Medline Plus, 2020). Moreover, protein is an element of antibody and enzyme (Medline Plus, 2020). Therefore, it is important for adolescents to maintain adequate intake of protein.

Table 1. Protein Intake

Category	N	Percentage (%)
Very Low	52	86.7
Poor	8	13.3
Adequate	0	0
Above average	0	0
Total	60	100

Table 1 shows that the protein intake in female students was in the very low category. Such a relatively very low protein intake among the female students is because they have lost their appetite during the first stage of puberty. They skip their breakfast, drink less water, and even opt for an unhealthy diet for the sake of getting a skinny body (consume less protein, carbohydrate, vitamin, and mineral). Interestingly, some admitted that they still eat less-nutritious snacks and fast food. Simply put, the diet is less-varied.

3.2 Iron Intake

Iron as one of macro minerals is highly important in maintain our health. It is the main component of red blood cells. Iron also involves in oxygen and electron transportation. Furthermore, iron plays significant role in deoxyribonucleic acid (DNA) synthesis (Abbaspour, Hurrell and Kelishadi, 2014). As a result, an adequate intake of iron can support optimal growth and development in adolescents.

Table 2. Iron Intake

Category	N	Percentage (%)
Very low	0	
Poor	57	95
Adequate	3	5
Above average	0	
Total	60	100

Table 9 shows that the iron intake in female adolescents was in a poor category. Most female students ate less food with iron content, although they were aware that iron is needed to prevent anaemia. Poor intake of iron can bring negative consequences such as impairment in cognitive development, immunity and work performance (Abbaspour, Hurrell and Kelishadi, 2014).

4. Discussion

Adolescence is a period during which a catch-up growth occurs. Fast growth processes in adolescents require significantly high energy and protein intake because adolescence is a period of physical and mental growth and development. In female adolescents, lack of nutrient intake is common. Lack of iron intake is mostly due to anaemia; however, there are other contributing factors, such as lack of folate, vitamin B12, vitamin A, chronic inflammation, parasitic infection, nutritional status, and education (Martini, 2015)(Suryani, Hafiani and Junita, 2017)(Telisa and Eliza, 2020).

Around 43% of death in adolescence correlates with pregnancy. Pregnancy inhibits the growth of many teenagers, although optimum development occurs during adolescence genetically. One of the approaches to breaking intergenerational malnutrition cycles is improving the quality of nutrient intake. Should the problem remain unsolved, problems and more severe consequences are inevitable (Suryani, Hafiani and Junita, 2017).

The results of the present study correspond to the results seen in a study by Simbolon (2019) which found that only a few respondents eat sufficient protein. In this study, the percentage of adequate protein intake, good category, reaches 9.6% (5 out of 52 respondents). In comparison, the percentage of low protein intake and protein deficiency is 30.8% (16 respondents) and 59.6% (31 respondents), respectively (Simbolon, 2019).

In this study, the lack of protein is due to the diet of the students. The data in the food recall 3x24-hour form reveals that the students tended to add more carbohydrates in their diet, e.g., rice and instant noodle. They ignore to add more protein source such as meats because they assumed that meats are high in fat.

Female students are recommended to consume varied food to meet their energy, protein, and micro-nutrient (vitamin and mineral) intakes. These nutrients are central to growth and an increase in blood volume and haemoglobin. Micronutrients (including iron and folate) are, in fact, necessary for female students. Consuming food with iron stimulates the formation of haemoglobin and prevents the loss of iron during the menstrual cycle (Menteri Kesehatan Republik Indonesia, 2014).

Sirajuddin et.al (2018) asserts that lack of iron intake is also caused by consuming less food containing heme and non-heme iron. The data in the food recall 3x24-hour form

reveals that the students preferred to consume more snacks, rice, and instant noodle. Moreover, the students admitted that they skipped their lunch. Snacks that the female students mostly consume are fritters, fried meatballs, and wafers (Sirajuddin, Surmita and Astuti, 2018). The results reveal the significant correlation between iron intake and anaemia prevalence (Soedijanto, 2015)(Telisa and Eliza, 2020).

5. Conclusions

Poor intake of protein and iron at female adolescents contribute to negative health consequences. Those are cognitive impairment, anaemia, loss of productivity and even delay in physical development. Therefore, it is important to encourage them in order to improve their intake by adding some nutritious foods. There are some efforts that can be done to promote protein and iron intake among female adolescents. Schools as educational institution should conduct the awareness of negative impacts on lack of protein and iron intake such as anaemia. Moreover, school can prevent body shaming that contribute to bad eating habit.

Conflict of Interest

The authors declare that they have no competing interests.

Author Contributions

ID contributed to majority of the final research report. FKD and FYD collected and analysed data. M edited the manuscript based on journal template and grammar.

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Ethical Issues

Ethical clearance was obtained from Ethic Committee of Gorontalo Health Polytechnic. The number is LB.01.01/KEPK/28.A/2019.

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