Media Pendidikan Gizi dan Kuliner

Journal homepage: https://ejournal.upi.edu/index.php/Boga/index

Consumption of Iron and Vitamin C In Female Students at SMKN 3 Cimahi

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ABSTRACTS

Anemia is a condition when the level of hemoglobin (Hb) in the blood is low. In Cimahi City, the prevalence of anemia in junior and senior high school girls in Cimahi based on data from the Health Service was 70% in 2016. Anemia in adolescent girls is influenced by several factors including consumption patterns. The number of young women who follow a strict diet, consume more plant foods that contain little iron compared to animal foods, so that iron needs are not met and their nutritional intake is not balanced. The purpose of this study was to analyze the consumption of iron and vitamin c of female students of SMKN 3 Cimahi. This research uses a cross sectional study design, the method used in this research is descriptive quantitative. Data were collected by means of interviews using Food Recall instruments 2x24 hours and Food Frequency Questionnaires. The results showed that the average adequacy of iron and vitamin C of female students at SMKN 3 Cimahi was 11.44 mg/day and 36.99 mg/day. The consumption of iron and vitamin C did not meet the recommended amount. Lack of consumption of iron and vitamin C can cause a lack of iron absorption so that you are prone to anemia. Adolescents should pay attention to the intake of iron and vitamin C consumption a day to match the recommendations.

ARTICLE INFO

Article History:
Received 30 October 2021
Revised 10 November 2011
Accepted 11 Novembe 2021
Available online 11 November 2021

Keyword:
Vitamin C
Iron
Female Student

1. INTRODUCTION

Anemia is a condition when hemoglobin (Hb) levels in the blood are low (<12 gr / dl) for adolescent girls (WHO, 2011). Anemia can be caused by various causes such as folic acid deficiency, vitamin B12, vitamin A, and iron. Young women have the highest risk for anemia, especially in adolescent girls aged 13-18 years with a prevalence of 22.7%. (Jaelani, 2017)

Adolescent girls are more susceptible to anemia due to several things, such as adolescents in their growth period require higher nutrients including iron, the presence of a menstrual cycle that causes young women to lose a lot of blood, many young women who are on a strict diet, consume more plant-based foods. which contains little iron compared to animal foods, so that iron needs are not met and their nutritional intake is not balanced. According to research conducted by Jaelani et al (2017), the factor that affects anemia in adolescent girls is the consumption pattern of iron absorption inhibitors.

Based on research conducted by WHO (2016) states that the prevalence of anemia in women of productive age in Indonesia is 29%. In Indonesia, according to Basic Health Research (2018), the prevalence of anemia in adolescents is 32.0%. West Java itself has the incidence of anemia in adolescent girls of 51.7%. (IDHS, 2012). In the city of Cimahi, the prevalence of anemia in junior and senior high school girls in Cimahi based on data from the Health Service was 70% in 2016. (Mustika. Arini. 2018)

From these data, it can be concluded that the prevalence of anemia in Indonesia is high. Based on research conducted by Shinta and Oster (2017) anemia in adolescent girls is influenced by several factors including consumption patterns.

Diet or food consumption pattern is the composition of the type and amount of food consumed by a person or group of people at a certain time. Teenage girls are usually very concerned about their body shape, so that many young women limit their food consumption and many restrictions on food. Adolescent girls are vulnerable to malnutrition during the peak period of growth and development if they lack nutrient intake. This is due to the wrong diet, the influence of the social environment (want to be slim). (Susilo, et al 2015)

According to the RDA, young women should consume 15 mg of iron per day and 75 mg of vitamin C per day. Efficient absorption of iron is very influential on the incidence of anemia, efficient and effective absorption of iron is iron in the form of ferrous found in animal foodstuffs, while plant foods contain iron in the form of ferries. Research conducted by Guntur et al (2004) said that the higher the iron consumption, the higher the hemoglobin level and the consumption of vitamin C can play a role in increasing iron absorption by four times (1:4). For this reason, an acidic atmosphere in the stomach is needed and compounds that can convert ferric to ferrous in the intestines, namely Vitamin C so that iron absorption is maximized (Susilo, et al. 2015).

Vocational High School students are in the age range of 16-18 years which are included in the adolescent age group, adolescence is a transitional age from childhood to adulthood (Nurjanah, 2012). One of the Vocational High Schools (SMK) in Cimahi is SMK Negeri 3 Cimahi. SMK Negeri 3 Cimahi has a study program of expertise and a package of expertise in the field of expertise of SMK/MAK Tourism, one of which is culinary management. In the Catering study program there are Nutritional Science subjects.

The subject of Nutrition Science is included in one of the subjects studied by class X students. The material taught in SMK with a total of, among others, explains the various

DOI: http://dx.doi.org/10. 17509/xxxxt.vxix
p- ISSN 2085-9783 e- ISSN 2549-6123

nutrients and their uses for the body, including related to the benefits of consuming foods that contain iron and Vitamin C (Mulya, 2017). Understanding the material presented by the teacher can be applied by students in their environment and daily life which is an achievement of learning outcomes (Sudjana. Nana. 1989).

Meanwhile, based on the results of Mulya's research (2017), the nutritional adequacy level of students at SMK Negeri 3 Cimahi, the level of vitamin C adequacy for students is 35% of the RDA and is included in the less category. This is a problem because if the level of adequacy of Vitamin C is lacking, the absorption of Iron in the body will not run optimally. If iron absorption is not optimal, it can cause iron deficiency anemia. Therefore, as a researcher as a culinary arts student with a concentration in dietetics who studies the science of dietetics, he is interested in conducting research on the consumption of iron and vitamin C based on the food patterns consumed by SMKN 3 Cimahi students.

2. METHODS

The study uses quantitative descriptive methods with cross sectional research designs. The population in this study was SMKN 3 Cimahi students as many as 336 students with a sample number of 77 students. In this study, the authors used the Food Frequency Questionnaire as a data retrieval technique as well as a 2x24-hour food recall.

3. RESULTS AND DISCUSSION

This research was conducted at SMK Negeri 3 Cimahi which is one of the vocational schools with a concentration of Tata Boga in educational services programs. In this study, respondents were selected as many as 77 based on the characteristics that have been determined, namely female and aged 16-18 years.

Based on the characteristics of the sample based on age, SMKN 3 Cimahi students aged 16 years as many as 41 students or 53%, age 17 years as many as 32 students or 42%, and age 18 years as many as 4 students or 5%. Based on the data, respondents were divided from class X as many as 26 students or 36%, class XI as many as 25 students or 32%, and class XII as many as 26 students or 36%.

The Nutritional Adequacy Figure recommended by the Ministerial Regulation for women aged 16-18 years to consume iron is 15 mg / day. Table 4.11 presents data on intake, recommendations, and adequacy levels of iron intake in students at SMKN 3 Cimahi based on the results of food recall 2x24 hours.

Table 1
Iron Intake and Adequacy Level

Iron Consumption	Consumtion mg/100	Suggestion (mg/100)	Adequancy Level
Average	11,44mg	15 mg	76%
Standard Deviation	8,4		
Minimal	1,86		
Maximal	44,53		

Based on table 1 the average iron intake of female students at SMKN 3 Cimahi which is calculated based on the results of 2x24 hour Food Recall is 11.44mg/day with the lowest

DOI: http://dx.doi.org/10.17509/xxxx.vxix
p- ISSN 2775-8400 e- ISSN 2775-9857

variation of iron intake being 1.86mg/day and the highest intake being 44.53mg /day. While the level of iron adequacy in female students at SMKN 3 Cimahi is 76%. Meanwhile, the distribution of samples based on adequancy of iron can be seen in Figure 1.

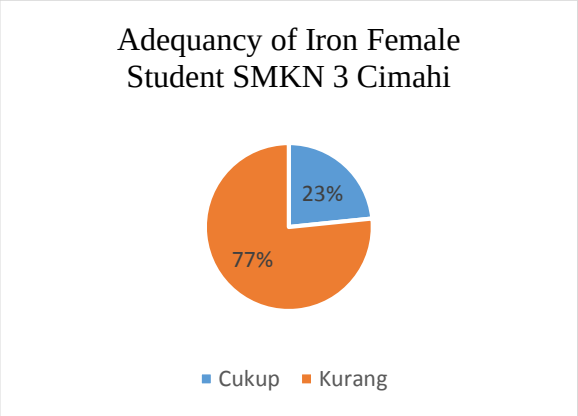

Figure 1. Adequacy of Iron Female Students SMKN 3 Cimahi

Based on picture 1 obtained the proportion of adequacy of iron intake that meets AKG standards or enough in SMKN 3 Cimahi students by 23% (18 people). While 77% (59 people) did not meet iron intake or less.

Table 2. **Intake and Adequacy Levels of Vitamin C**

Consumption Vitamin C	Consumption mg/100	Anjuran (mg/100)	Adequancy Level
Average	36,99	75mg	49%
Standard Deviation	34,87		
Minimum	2,05		
Maximum	160,45		

Based on the average table of iron intake in female students in SMKN 3 Cimahi calculated based on the results of Food Recall 2x24 hours is 36.99mg / day with the lowest iron intake variation is 2.05mg / day and the highest intake is 160.45mg / day. While the level of iron adequacy in female students in SMKN 3 Cimahi is 49%. Respondents based on the adequacy of Vitamin C can be seen in Figure 2.

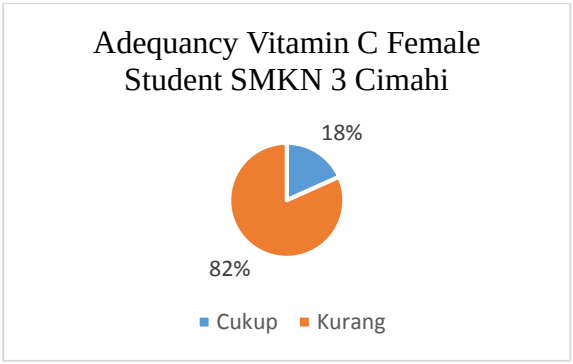

Figure 2. Adequancy vitamin C Female Student SMKN 3 Cimahi

DOI: http://dx.doi.org/10. 17509/xxxxt.vxix
p- ISSN 2085-9783 e- ISSN 2549-6123

Based on the figure of 2 respondents who met the recommended vitamin C intake in accordance with the recommended RDA of 18% (15 people) and respondents who did not meet vitamin C intake by 82% (67 people).

3.1 TYPES OF FOODS CONTAINING IRON CONSUMED

3.1.1 STAPLE FOOD

The most consumed staple food is rice. This is supported by research conducted by Dewi and Mahmudiono (2013) which showed that the most commonly consumed source of carbohydrates is rice. Although the iron content in rice is 0.4mg / 100, rice is a staple food of Indonesian society.

Almost 97% of Indonesians consume rice as the main staple food (velecia, 2013). In addition, rice is easily obtained and has been consumed by families for generations. Both of these are determinants of a person's eating habits (Mokoginta et al., 2016). Indonesia as an agrarian country can produce rice and rice up to 54.65 million tons with a rice harvest area of 10.66 million hectares. This then became one of the factors in the number of percentages of SMKN 3 Cimahi students in consuming rice. Meanwhile, corn that has a Fe content of 2.1mg / 100 is only most of respondents consume it (88%).

3.1.2 PLANT BASED FOOD

Based on the results of the study, it was found that the most consumed type of plant based food was tempeh, the iron content of tempe itself was 4 mg/100. Research conducted by Nomate et al. (2017), Pay (2021) and Sari (2021) show that the vegetable protein that is often consumed by adolescents is tempeh. This is because tempeh is a type of food that is often found in Indonesia. In addition, tempeh has an affordable price and is easy to process into various types of food. Meanwhile, walnuts, which are plant based foods that contain 7.7 mg/100 Fe, only less than half of the respondents consumed it (27%).

3.1.3 ANIMAL BASED FOODS

The most consumed type of animal based foods source is eggs, the iron content of eggs is 2.7 mg/100. Insani's research (2020) also shows the same result, namely eggs are animal protein that is often consumed by teenagers. The number of students who consume eggs is due to the large supply of eggs in the market so they are easy to obtain. In addition, the price of eggs is cheaper than the price of chicken and meat. Based on data from the BPS 2020 which states that egg production in Indonesia reaches 1.45 million tons. This is then comparable to the reasons that affect the students of SMKN 3 Cimahi in consuming eggs.

Then the results of the study obtained that only a small proportion of students consumed pork (1%). This is because the majority of students at SMKN 3 Cimahi are Muslim, so only a small proportion consume pork. The iron content of pork itself is 1.8 mg/100.

3.1.4 FRUITS

The most widely consumed type of fruit is the Ambon banana. Similar results were found in the study of Rahman et al. (2020) which shows that the fruit most often consumed by adolescents is bananas. This is because banana is a fruit that is easily obtained and the price is quite affordable. Ambon bananas have an iron content of 0.5 mg/100. Consumption of

DOI: http://dx.doi.org/10.17509/xxxx.vxix
p- ISSN 2775-8400 e- ISSN 2775-9857

Ambon bananas is found in processed products such as banana juice, and is an addition to the contents of toast.

Meanwhile, based on the data obtained, only the majority of respondents (86%). Consumption of salak is found to be a morning interlude or an afternoon interlude.

3.1.5 VEGETABLES

The most consumed type of vegetable is kale. Research conducted by Mokoginda et al. (2016) and Gulo (2019) showed the same results, namely kale is a vegetable that is often consumed. The iron content of kale is 2.5 mg/100. The most widely processed kale in the respondent's consumption is stir-fried kale. Meanwhile, spinach which has an iron content of 3.5 mg/100 was consumed by most of the respondents.

3.1.6 SNACKS

The most consumed type of snack is batagor. This is in line with research conducted by Alivionita (2014) showing that teenagers often consume batagor. This is because most teenagers like the consumption of fried foods. batagor's iron content is 4.50 mg/100. Meanwhile, kuaci which is a type of snack that has an iron content of 6.2 mg/100, only more than half of the respondents consume it.

3.1.7 DRINKS

The most consumed type of drink is dawet. The results of Sulistiyani's research (2018) show that the type of drink that is often purchased by teenagers is dawet. Dawet has an iron content of 2.28 mg/100 while the respondents who consume soy milk are only more than half (68%). The iron content in soy milk is 0.7mg/100. Consumption of milk can be found in processed agar or consumed directly.

3.2 TYPES OF FOODS CONTAINS VITAMIN C CONSUMED

3.2.1 VEGETABLES

The type of vegetable that contains vitamin C is the most consumed is broccoli. Research conducted by Ramadhani and Hidayati (2017) shows that the type of vegetable favored by teenagers is broccoli. Consumption of broccoli is often found in mixed vegetable soups and stir-fries. Broccoli contains vitamin C of 61 mg/100. Meanwhile, Moringa leaves which contain 220 mg/100 of vitamin C, only less than half of the respondents consume it.

3.2.2 FRUITS

The type of fruit that is most often consumed is sweet orange. This is supported by research by Ramadhani and Hidayati (2017) and Insani (2020) which shows that adolescents often consume oranges. Consumption of sweet oranges can be found in agar fillings or consumption directly. Sweet orange has a vitamin C content of 49mg/100.

3.2.3 DRINKS

The type of drink containing vitamin C that is most often consumed is orange nutrisari. This can be caused because the price of Nutrisari is much cheaper than Buavita. Because one of the factors that influence food consumption is pocket money (Imthani & Noer, 2013). Nutrisari consumption is mostly found as processed cold drinks and mixtures of agar-agar. Nutrisari

DOI: http://dx.doi.org/10. 17509/xxxxt.vxix
p- ISSN 2085-9783 e- ISSN 2549-6123

oranges contain vitamin C of 285 mg/100. Meanwhile, orange buavita was only consumed by more than half of the respondents (60%).

3.3 TOTAL CONSUMPTION AND ADEQUACY OF IRON AND VITAMIN C

Based on the results of the study, the amount of iron consumption in female students at SMKN 3 Cimahi was 1.67 mg/day for staple foods, 2.34 mg/day for plant sources, 3.33 mg/day for animal sources, 1.47 mg/day for vegetables, 1.30 mg/day fruits, 0.18 mg/day drinks, and 1.15 mg/day snacks. Meanwhile, the amount of vitamin C consumption by students at SMKN 3 Cimahi is on average per day, namely, plant food sources 4.98 mg/day, vegetables 14.76 mg/day, fruits 11.63 mg/day, drinks 3.27 mg/day. day, and snacks 2.35 mg/day.

The level of iron adequacy in students at SMKN 3 Cimahi is 76% or in the less category with the average iron intake for students at SMKN 3 Cimahi which is calculated based on the results of Food Recall 2x24 hours is 11.44mg/day. This average is below the standard of the Nutrient Adequacy Rate recommended by the Ministerial Regulation for women aged 16-18 years to consume iron, which is 15 mg/day.

The proportion of adequacy of iron intake that meets the RDA standard or is sufficient for students of SMKN 3 Cimahi is 23% (18 people). A total of 59 people or 77% of respondents included in the category of lack of iron consumption based on the Nutritional Adequacy Rate.

Lack of iron intake from food consumed daily can cause anemia. The higher the iron intake, the hemoglobin level will increase, so the incidence of anemia is low (Kirana, 2011).

Anemia causes decreased immunity, learning concentration, fitness and productivity. If left unchecked, it can have an effect in the future such as being pregnant with anemia and affect the baby being born. (Fadhilah, 2020). In addition, according to Almatsier (2004), iron acts as a cellular respiration, namely as a cofactor for enzymes involved in oxidation-reduction reactions.

The level of vitamin C adequacy in female students at SMKN 3 Cimahi is 49% with the average intake of vitamin C calculated based on the results of Food Recall 2x24 hours is 36.99 mg/day. This average is below the Nutrition Adequacy Rate recommended by the Ministerial Regulation for women aged 16-18 years to consume vitamin C, which is 75 mg/day.

The proportion of adequacy of vitamin C intake that meets the RDA standard or is sufficient for students of SMKN 3 Cimahi is 18% (15 people). Meanwhile, 82% (67 people) did not meet the intake of vitamin C or did not consume enough vitamin C based on the Nutritional Adequacy Rate.

Lack of vitamin C can make iron absorption not optimal, because one of the functions of vitamin C is the absorption and metabolism of iron. Vitamin C inhibits the formation of hemosiderin which is difficult to mobilize to liberate iron when needed. Absorption of iron in the form of non-heme increases fourfold in the presence of vitamin C. Vitamin C plays a role in transferring iron from transferrin in the plasma to ferritin in the liver (Almatsier, 2010).

Vitamin C in the body must be sufficient to avoid anemia, because of the role of vitamin C as a reducing agent, iron in the intestine is maintained in the form of ferrous, so that ferrous is more easily absorbed. (Muchtadi, 2009). According to Choiriyah (2015), the higher the intake of vitamin C and iron, the higher the hemoglobin in the blood and reduce the risk of anemia.

DOI: http://dx.doi.org/10.17509/xxxx.vxix
p- ISSN 2775-8400 e- ISSN 2775-9857

4. CONCLUSION

The types of foods that contain iron that are widely consumed are, the most consumed staple food is rice, the most consumed types of animal and vegetable foods are eggs and tempeh. Types of vegetables and fruits kangkung and bananas Ambon The most consumed type of snacks is batagor. The type of drink most consumed is dawet. The type of food that contains vitamin C is widely consumed, namely, the most consumed vegetable is broccoli. The type of fruit that is most often consumed is sweet orange. The type of drink containing vitamin C that is most often consumed is orange nutrisari. The amount of iron consumption in female students at SMKN 3 Cimahi is 1.67 mg/day for staple foods, 2.34 mg/day for vegetable food sources, 3.33 mg/day for animal sources, 1.47 mg/day for vegetables, 1 fruit. ,30 mg/day, 0.18 mg/day drinks, and 1.15 mg/day snacks. Meanwhile, the amount of vitamin C consumption by students at SMKN 3 Cimahi is on average per day, namely, plant food sources 4.98 mg/day, vegetables 14.76 mg/day, fruits 11.63 mg/day, drinks 3.27 mg/day. day, and snacks 2.35 mg/day. The average iron intake of respondents was 11.44 mg/day with the level of iron adequacy in students at SMKN 3 Cimahi was 76% or in the less category. The average intake of vitamin C of students at SMKN 3 Cimahi is 36.99 mg/day with a level of vitamin C adequacy of 49% or in the less category.

Adolescents should pay attention to the intake of iron and vitamin C consumption every day in accordance with the recommendations. Food providers at home, such as parents, also pay attention to the availability of iron and vitamin C as a source of nutrition for teenagers.

5. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. Authors confirmed that the paper was free of plagiarism.

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