

Effects of Red Kupang Nugget on Changes in Fe Consumption in School-Age Children with Anemia

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Abstract

School-aged children are one of the age groups who are prone to anemia. Iron deficiency anemia in school-age children can be caused by three factors, the first is an increased need for iron because children are in a period of growth, the second is the low intake or bioavailability of iron in the diet, and the third is the presence of infections. This study aimed to analyze the effects of red kupang nuggets to increase Fe consumption and Hb levels in school-aged children. This research was an experimental study located in three orphanages in Candi Sub-district, Sidoarjo District, East Java Province, Indonesia, from May to June 2017. The sample was children who were raised in the three orphanages, which meet the inclusion criteria which was 7-12 years old and had Hb levels <12 gram%. The treatment given to children was the provision of red kupang nuggets. Data of the respondent's character were collected through interviews. Data of the level of food consumption was obtained through food consumption recall questionnaire for 24 hours, then compared with standard of nutrient adequacy rate. Data of Hb levels was obtained through examination using Quick-check. The collected categorical data was then analyzed descriptively in the form of frequency and percentage, while numerical data was presented in the form of central tendency and dispersion. Based on the results of the study can be concluded that consumption of red kupang nugget as food interlude can increase the level of Fe consumption and Hb levels in the blood in children in orphanages in Sidoarjo, East Java. Furthermore, it is advisable to do further research in different places, and with a longer duration. Also needed analysis of the types of foods that can inhibit the absorption of Fe.

Keywords: Iron deficiency anemia, School-age children, Fe consumption, Red kupang nugget

I. INTRODUCTION

According to Arisman (2004), school-aged children are one of the age groups who are prone to anemia. Several studies have reported that the prevalence of anemia in children is still relatively high at 25% (WHO, 2004). Anemia is characterized by decreased levels of hemoglobin in the body. Low levels of Hb in the blood can cause symptoms of lethargy, weakness, fatigue, and quickly forget. For the students, this condition can increase the absenteeism in the learning activities in school so as to decrease the learning achievement. In addition, iron deficiency anemia will lower the immune system so it is more prone to infection (Kirana, 2001).

Iron deficiency anemia in school-age children can be caused by three factors. The first factor is an increased need for iron because children are in a period of growth. The second factor is the low intake or bioavailability of iron in the diet. The third factor is the presence of infections such as malaria, HIV and worms (Arisman, 2004). In addition, low levels of education, economic status and social status are also fundamental causes of anemia in Indonesia.

There are various efforts that can be done to prevent and cope with iron deficiency anemia. The first attempt is to increase iron consumption from natural sources. This effort can be done through education or counseling about nutrition to the community, especially about foods from animal sources that are easily absorbed, as well as foods that contain lots of vitamin C and vitamin A that can help the absorption of iron and help the process of formation of hemoglobin. The second attempt is to fortify adding iron, folic acid, vitamin A and essential amino acids in the usual food ingredients eaten daily. The third attempt is to regularly provide iron and folate supplementation to anemic patients over a period of time to increase hemoglobin levels rapidly (Zulaekah, 2007).

Red kupang is one of the local food available and often consumed in Sidoarjo Regency, East Java Province, Indonesia, but its processing is still limited. On the other hand, nuggets are processed foods that are practical and are one of the fast food types. According to Fanny (2015), red kupang nuggets contain 9.9 grams of protein, 6.8 grams of fat and 30.7 grams of carbohydrates. In addition, the Fe content in red kupang is 57.84 ppm.

The orphanage is a place to accommodate orphans, is a social welfare institution responsible for providing replacement services in the fulfillment of physical, mental, and social needs for children. The orphanage should get attention because the school-aged children in it need nutritional adequacy to support their growth and

development. The provision of food in orphanages is generally simple so it is likely that children are not getting their nutritional needs fulfilled. One of the nutritional problems that can happen to them is anemia. Based on the above description it is necessary to study the effects of red kupang nuggets to increase Fe consumption and Hb levels in school-aged children.

II. METHODS

This research was an experimental study located in three orphanages in Candi Sub-district, Sidoarjo District, East Java Province, Indonesia, from May to June 2017. The sample was children who were raised in the three orphanages, which meet the inclusion criteria which was 7-12 years old and had Hb levels <12 gram%.

The treatment given to children was the provision of red kupang nuggets made based on the recipe in accordance with the results of Fanny's (2015) study, with details as follows:

1. Red kupang: 1000 gram
2. Wheat flour: 100 grams
3. Tapioca flour: 100 grams
4. Garlic: 150 grams
5. Red onion: 25 grams
6. Pepper powder: 2 grams
7. Coriander powder: 10 grams
8. Salt: 20 grams
9. Sugar: 50 grams

The nugget making process began with material selection, weighing materials using digital scales, grinding materials, mixing materials, printing and steaming, lubricating (flour, egg, salt, flour) and frying pan. Children were given red kupang nuggets at a dose of 50 grams / day for one month. The portion of this nugget had been adjusted to the caloric needs of intercourse for school-age children is 10% of total calories.

Data of the respondent's character (age, gender and amount of allowance) were collected through interviews. Data of the level of food consumption was obtained through food consumption recall questionnaire for 24 hours, then compared with standard of GER (nutrient adequacy rate). Data of Hb levels was obtained through examination using Quick-check (using capillary blood). Referring to Nugroho (2014), the collected categorical data was then analyzed descriptively in the form of frequency and percentage, while numerical data was presented in the form of central tendency and dispersion.

III. RESULTS

Table 1. Gender Distribution of Children

Gender	Frequency	Percentage
Male	5	50
Female	5	50
Total	10	100

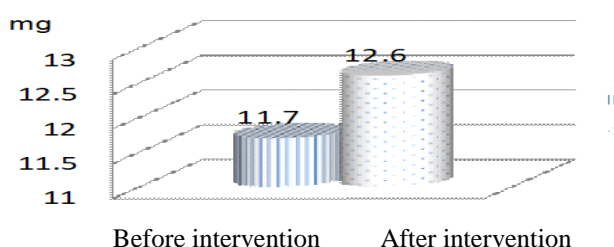


Figure 1. Amount of Fe Consumption Before and After Intervention

Table 2. Amount of Fe Consumption Before and After Intervention

Amount of Fe Consumption	Before Intervention	After Intervention
Mean	11.7	12.6
Standard Deviation	4.3	4.2
Minimum	7	9
Maximum	21	23

Amount of Fe consumption before being given red kupang nuggets were 11.7 mg (\pm 4.3 mg), whereas after being given red kupang nugget increased to 12.6 mg (\pm 4.2 mg). However, the paired samples t-test showed that p-value = 0.081, which means there was no difference in the amount of Fe consumption between before and after giving red kupang nugget.

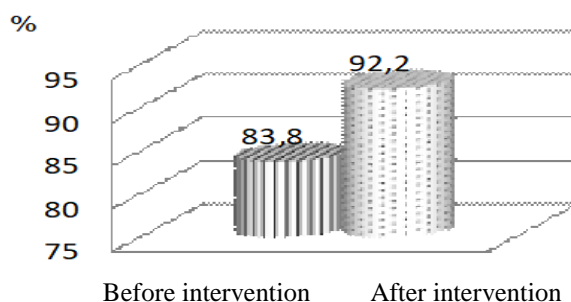


Figure 2. The Levels of Fe Consumption Before and After Intervention

Table 3. The Levels of Fe Consumption Before and After Intervention

The Levels of Fe Consumption	Before Intervention	After Intervention
Major deficit	3 (30%)	2 (20%)
Medium deficit	4 (40%)	2 (20%)
Minor deficits	0 (0%)	3 (30%)
Normal	3 (30%)	2 (20%)
More	0 (0%)	1 (10%)
Total	10 (100%)	10 (100%)

After being given red kupang nugget, the mean of the levels of Fe consumption increased from 83.8% (\pm 15.27) to 92.2% (\pm 22.16). The result of paired samples t-test showed p-value = 0,036, so it was concluded that there was difference of the levels of Fe consumption between before and after giving red kupang nugget.

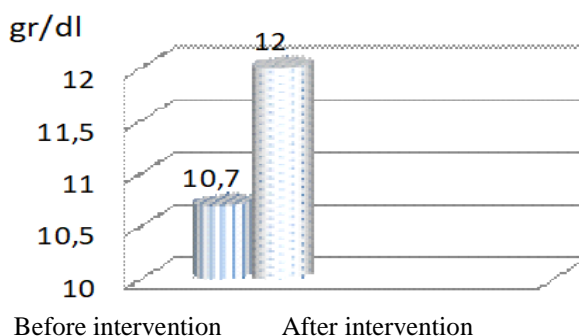


Figure 3. The Hb Levels Before and After Intervention

The mean of Hb level before being given red kupang nuggets was 10.7 gram% (\pm 0.48). After being given red kupang nugget, the mean of Hb level increased to 12 gram% (\pm 1.33). The result of paired samples t-test showed p-value = 0.009 which means there was difference of Hb level between before and after giving red kupang nugget.

Table 4. The Hb Levels Before and After Intervention

Hb Levels	Before Intervention	After Intervention
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Mean	10.7	12
Standard Deviation	0.48	1.33
Minimum	10	10
Maximum	11	14

IV. DISCUSSION

The mean of total Fe consumption increased from 11.7 mg to 12.6 mg after being given red kupang nuggets to children in orphanages with low Hb levels. Based on the GER (nutrient adequacy rate), iron requirement for children aged 7-9 years is 10 mg, for boys aged 10-12 years is 13 mg, while for girls aged 10-12 years is 20 mg. The results of this study indicate that the level of Fe consumption after the red kupang nugget increased from the light level deficit category (83.8%) to normal category (92.2%).

Our bodies need iron to support growth, assist the working of enzymes in the body, fight infections, assist bowel function in neutralizing toxins and most importantly as sources of hemoglobin formation. The amount of iron stored in the human body is about 4 grams. One effort to prevent and overcome iron deficiency anemia is by eating foods containing Fe. Iron contained in 'iron-hem' shaped foods such as hemoglobin and myoglobin present in animal food sources, and 'iron-nonhem' present in plant-based foods. 'Iron-hem' is only a small portion of iron obtained from food (approximately 5% of total iron), especially in Indonesia, but which can be absorbed by 25%, while 'iron-nonhem' is only 5% (Almatsier, 2003). Iron is widely contained in animal foods, nuts, and dark green vegetables. Impaired Fe fulfillment by the body often occurs as a result of the low absorption rate of Fe in the body, especially from vegetable sources with absorption of only 1-2%, meanwhile, the absorption of Fe derived from animal food sources can reach 10-20%. The best sources of iron food are liver, oysters, shellfish, kidneys, lean meats, chicken, duck and fish.

The amount of iron that can be absorbed by the body is affected by the amount of iron contained in the food, the bioavailability of iron in food and absorption by the intestinal mucosa. Iron bioavailability is influenced by nutrient composition in food. Ascorbic acid, meat, fish and poultry will increase absorption of iron-nonheme. Types of foods containing tartan (found in tea and coffee), calcium, phytate, rice, egg yolks, polyphenols, oxalates, phosphates, and drugs (antacids, tetracyclines and cholestyramines) will reduce iron absorption.

In her research, Fanny (2015) reported that red kupang nugget has been tested to 88 panelists with members of fourth grade elementary school students. The results of this test indicate that there was no significant difference in preference levels between red kupang nuggets and tengiri fish nugget. Based on these conclusions, red kupang nugget considered feasible to be consumed. Fe levels on red kupang nugget is 4 mg / 100 g. An increase in Fe consumption levels in children is possible as a result of the addition of a red kupang nugget.

Hb levels in the blood of children increase after they consume red kupang nugget. This is similar to the results of research conducted by Pradanti, et al. (2015) that Fe levels is related to hemoglobin level in female students in SMP Negeri 3 Brebes, Central Java. The results of this study are also in line with the results of research conducted by Arifin, et al. (2013) who reported an association of Fe intake with Hb levels in the blood.

V. CONCLUSION

Based on the results of the study can be concluded that consumption of red kupang nugget as food interlude can increase the level of Fe consumption and Hb levels in the blood in children in orphanages in Sidoarjo, East Java. Furthermore, it is advisable to do further research in different places, and with a longer duration. Also needed analysis of the types of foods that can inhibit the absorption of Fe.

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