

# Composition of Chicken Liver Nugget to Organoleptic and Hemoglobin Levels in the Efforts to Prevent Adolescent Female Anemia

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**Abstract** One of the efforts to deal with anemia is through increased consumption of foods that contain lots of iron. The highest iron in animal sources from chicken liver. The purpose of this study was to determine the effect of the composition of chicken liver nugget on Organoleptic and hemoglobin levels in efforts to prevent anemia in the adolescent female. This research was quantitative descriptive research with the pre-experimental design. The sample in the study was 70 teenage female who were 30 respondents as organoleptic respondent and 40 respondents divided into four groups with the intervention of different types of nugget composition. With ten respondents in each group. Data collection was done by measuring preferred consumption from the organoleptic test and the pre and post hemoglobin level consumption of chicken liver nugget. The results of the organoleptic test showed that the majority respondent prefers to consume T2 chicken liver nugget with mean 3.31 which have 20% chicken liver. And the results showed that hemoglobin levels increased after consuming T2 chicken liver nugget by 90% with an average hemoglobin increase of 1.72 gr / dL.

## 1 INTRODUCTION

Anemia is a public health problem that is prevalent and spread throughout the world, especially in developing countries. Adolescent female have a ten times greater risk of anemia than young men. Adolescent female experience increased iron requirements due to growth spurts and menstruation (Lynch, 2000). In addition, young women are usually very concerned about body shape, so many limit the consumption of food and abstain from many foods (Sediaoetomo, 1992).

Anemia that occurs in adolescents can cause the impact of delays in physical growth, behavioral, emotional disturbances. This can affect the process of growth and development of brain cells so that they can cause a decrease in body resistance, weakness and hunger, impaired learning concentration, decreased learning achievement and can result in low work productivity. If the condition is acute, the condition of anemia can cause death. Anemia that occurs in adolescent female is also a risk of physical and mental dysfunction, and can increase the risk of disruption during pregnancy (Sediaoetomo, 1992). According to Yip (1998) iron status must be repaired before

pregnancy, from adolescence so that anemia can be reduced during pregnancy.

According to the World Health Organization (WHO) (2013), the prevalence of anemia in the world ranges from 40-88%. Based on data from Riskesdas in 2013, the prevalence of anemia in Indonesia is 21.7% with anemia patients aged 15-24 years at 18.4% (Ministry of Health, 2013). Various surveys conducted for school students in Indonesia showed an anemia prevalence of 36% -43% (Astuti & Rosidi, 2014).

Based on the results of research conducted by Andasari (2017) showed that 60 of 86 or 70% of santri ma'had Aly Sukorejo students experience anemia. Research conducted by Soan (2018) showed that 87 out of 90 or 97% of students of the D III Midwifery Program at Ibrahimy University experience anemia.

In general, the high prevalence of anemia in Indonesia is caused by iron deficiency and other minerals, such as vitamins A, C, folate, riboplafin and B12 (Briawan, 2014). Similarly, based on the results of research conducted by Andasari (2018) showed that there was a significant relationship between nutritional intake and the occurrence of anemia in girls in the Ma'had Aly dormitory at Salafiyah Syafi'iyah

Islamic Boarding School Sukorejo Situbondo with Pvalue 0.038 (Andasari, 2018).

One of the efforts to deal with anemia is through increasing consumption of foods that contain lots of iron. Heme iron is more abundant in animal foods. Heme iron is easier to absorb than non-heme iron (Hurrell & Egli, 2010).

Processed meat products which are currently quite popular among the community are chicken nuggets. However, the content of nugget is less significant in increasing Hb levels. In addition, not all nuggets can be ensured food safety. So that the development of chicken nuggets is done by substituting chicken liver. Chicken liver is one source of heme iron that is good and easily found in the community. Chicken liver is expected to increase levels of vitamin A and iron (Fe) chicken nuggets.

The purpose of this study was to determine the effect of the composition of chicken liver nugget on organoleptic and hemoglobin levels in an effort to overcome anemia in adolescent female.

## 2 METHOD

This research was a descriptive quantitative research with pre-experimental design. This research was conducted at the major of D III Midwifery, Health Sciences Faculty, Ibrahimy University during March-August 2018. The population in this study were all young women, namely all DIII students of Ibrahimy University Midwifery Study Program. Samples in the study were 70 respondents, the first 30 respondents were carried out for organoleptic tests and 40 respondents were divided into 4 groups with interventions which were different types of nugget composition. The research sampling technique was conducted by purposive sampling where the criteria were a) Students of DIII Ibrahimy University Midwifery, b) Students who had a minimum sleep time of 4 hours, c) Not menstruating, d) Not in a fasting state during research, e) Willing to be a research respondent.

Data collection was carried out by organoleptic testing, Hb level testing and laboratory validation. Organoleptic tests were carried out on 30 respondents based on color, aroma, taste, elasticity and texture. This test is carried out on 30 respondents with a rating of 1-4 Likert scale. Hb level test was carried out by giving nuggets with 4 different treatments to 4 different groups with each of the 10 respondents in each group. Each group consumed nuggets with different compositions.

The process of making chicken liver nuggets is ground chicken meat and steamed chicken liver

weighed according to treatment. Milled chicken meat, steamed chicken liver, ingredients and spices mixed into one. The mixture is mixed using a blender until it is completely evenly distributed and then printed and steamed approximately 20 minutes  $\pm 100^{\circ}$  C. The cooked mixture is steamed and then cooled. This dough were then cut into pieces lengthwise. The nugget slices covered with egg white and rolled over the pan flour, then fried for 2-3 minutes until brownish yellow. Chicken liver nuggets are made in 4 formulas, which distinguishes only the proportion of meat and chicken liver that are different as in Table 1.

Table 1: Composition of Chicken Heart Nugget

No	Ingredient	T1 (0%)	T2 (20%)	T3 (40%)	T4 (100%)
1	Chicken meat (g)	250	200	150	-
2	Chicken's liver (g)	-	50	100	250
3	Seasoning, etc				

In the effect test, Hb levels were checked before consuming food. Interventions were then carried out nutritional recall and measurement of Hb levels after 24 hours of consumption of chicken liver nugget. After obtaining the results of organoleptic tests of selected chicken liver nuggets and chicken liver nuggets which most significantly increased Hb levels, then laboratory tests were carried out on the levels of iron, protein and vitamins in the selected sample as a form of validation.

The instrument used in this study was a questionnaire with a Likert scale for organoleptic tests and observation sheets to document Hb levels, Nutrition Recall 1x 24 hours. Nutri survey software to see the nutritional content of respondents. GCHb Easy Touch Brand, Blood lancet, alcohol swab and a drop of blood to determine the state of anemia. The equipment used in processing nuggets were blenders, electric scales, baking panes, labels and other equipment used in processing nuggets.

## 3 RESULT & DISCUSSION

Chicken liver nuggets in the study were aimed at innovating food additives (BTP) with the aim of preventing adolescent girls' anemia. The results of the organoleptic test and its effect on increasing hemoglobin levels are used as a reference for the best formula in preventing anemia.

## Organoleptic Quality

The results showed that out of 30 respondents who carried out organoleptic tests both from color, taste, elasticity, texture and aroma of chicken liver nugget with the selected T2 formula with the best formulation, nuggets containing 20% chicken liver. This is as in table 2.

Table 2: Organoleptic Test Results of Chicken Heart Nugget

Formula	Mean
T1 (0%)	3.13
T2 (20%)	3.31
T3 (40%)	3.02
T4 (100%)	2.45

Details of the results of organoleptic tests as Table 3.

Table 3. Organoleptic Test Results of Chicken Heart Nugget

Organoleptic Quality	Formula	Mean	Characteristics
Color	T1 (0%)	3.27	Interesting
	T2 (20%)	3.13	Interesting
	T3 (40%)	2.67	Not Interesting
	T4 (100%)	1.80	Very Not Interesting
Organoleptic Quality	Formula	Mean	Characteristics
Scent	T1 (0%)	2.97	fishy
	T2 (20%)	3.20	Not fishy
	T3 (40%)	2.80	fishy
	T4 (100%)	2.30	fishy
Organoleptic Quality	Formula	Mean	Characteristics
Taste	T1 (0%)	3.03	Delicious
	T2 (20%)	3.37	Delicious
	T3 (40%)	3.27	Delicious
	T4 (100%)	2.70	Not Delicious
Organoleptic Quality	Formula	Mean	Characteristics
Elasticity	T1 (0%)	3.13	Enough elasticity
	T2 (20%)	3.37	Enough elasticity
	T3 (40%)	3.07	Enough elasticity
	T4 (100%)	2.73	Not elastic
Organoleptic Quality	Formula	Mean	Characteristics
Texture	T1 (0%)	3.27	Not easily broken
	T2 (20%)	3.50	Not easily broken
	T3 (40%)	3.30	Not easily broken
	T4 (100%)	2.60	Not easily broken

Color in organoleptic quality can be assessed by the eye's sense of sight to give an initial visual interest in a product (Lawless, 2010). The mean value of T1 (0%) showed the highest score. While T4 (100%) showed the lowest score, the color of the T4 chicken nugget was the blackest compared to the others. The scent on organoleptic quality was assessed using the

sense of smell of the nose with an intermediary medium for olfactory receptors that works to capture substances in the air that pass through the nasal cavity (Lamless, 2010). T2 (20%) showed the highest score on the aroma of organoleptic quality. Comparison with T4 showed that T2 modification is much better in terms of aroma compared to T4. T4 feels very fishy.

Whereas the taste of organoleptic taste can be assessed using the help of the taste of the tongue to perceive the interaction of the combination of four basic tastes namely sweet, salty, sour and bitter. The highest mean was obtained in T2 (20%) with sufficient salty taste.

The elasticity of organoleptic quality was measured by visual and visual assessment. T2 (20%) has the largest mean score in organoleptic quality assessment. Texture is an indicator of organoleptic quality that is assessed by a combination of the senses of sight and touch and hearing. T2 (20%) indicates the highest score for texture. Comparison with the T4 formula showed that the modification of the substitution of full liver chicken nugget gives the soft texture to the nugget so that it was easily destroyed.

## Effect of Chicken Heart Nugget on Hemoglobin Increases

The results of checking Hb levels of students of D III Midwifery Ibrahimy University before and after consumption of chicken liver nuggets obtained an average increase in the amount of hemoglobin levels as Table 4.

Table 4. Comparison of Mean Increase in Hemoglobin Level of Chicken Liver Nugget T1-T4

No	Formula	Mean Pre Hb Level (gr/dL)	Mean Post Hb Level (gr/dL)	Mean Increase in Hb Level (gr/dL)
1	T1	12.65	13.21	0.56
2	T2	11.19	12.91	1.79
3	T3	12.61	13.88	1.27
4	T4	11.62	11.22	0.60

Based on the results of this study indicate that the composition of T2 chicken liver nugget is 200gr of chicken meat and 50gr of chicken liver which is best and preferred by respondents both from organoleptic results and increased hemoglobin levels of adolescent girls.

Then, the T2 chicken liver nugget laboratory test was conducted to determine the levels of fat, iron, protein and vitamin C. Laboratory test results are shown in Table 5.

Table 5. Laboratory Test Results Chicken liver Nugget T2 and T4

Formula	Fat (%)	Protein (%)	Vit. C (%)	Fe (ppm)
T2	17.64	16.89	0.79	17.87

Based on Table 5 showed the nutritional content of the best chicken liver nugget (T2) per 100 g. Protein is one of the macronutrients that play an immune function, regenerate damaged tissue and growth. Protein content in selected chicken liver nugget was 16.89%. While the fat content of 17.64% with the taste produced, this formulation proved to be acceptable to respondents both from taste and benefit in increasing hemoglobin levels.

The taste and distinctive aroma of meat in poultry-based food processing is influenced by the presence of fat. Fat serves as an energy source and also plays a role in improving texture and taste, in this case fat increases savory flavor (USDA Agriculture Research Service, 2016).

Iron is a micronutrient that plays an important role in preventing the occurrence of iron anemia, especially in women (Adriani, 2014). The iron content in T2 is 17.87 ppm or 1.78 mg, so the addition of chicken liver adds iron content which is not contained in commercial nuggets. In preventing anemia, iron consumption is an essential one, because iron consumption deficiency increases the risk of 276 times greater (Syatriani in Malichati, 2018).

## CONCLUSIONS

Based on the results of the organoleptic quality test, the T2 formula (chicken liver substitution 20%) was obtained as the highest mean accumulation formula. The results of the test of the effect of chicken liver nugget showed that the T2 formula was also significantly increased in hemoglobin levels. The T2 formula was then analyzed for nutritional content, the results of laboratory analysis showed chicken liver nugget formula T2 containing 17.87 ppm iron, 17.64% fat, 16.89% protein and 0.79% vitamin C.

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