TILAPIA AND CATFISH PURULUK MEDIA TO INCREASE HEMOGLOBIN LEVELS IN CHILDREN, ADOLESCENTS AND WOMEN IN REPRODUCTIVE AGE

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Abstract. The World Health Organization (WHO) statistics in 2021 shows that the prevalence of anemia in women of reproductive age (15-49) in the world in 2019 was around 29.9%. The results of the 2018 RISKESDAS report by Balitbangkes in Indonesia, the prevalence of anemia in adolescent girls is around 27.2% in the 15-24 year age group. The development of the use of tilapia and catfish product forms into flour is one form of effort to increase the variety of types of food sources of high protein. The development of food variations from flour can be used both for preventing anemia, improving the nutritional status of adolescents, women in reproductive age, as well as being used as complementary foods and snacks for toddlers. Aim : To identify the effect of Tilapia and Catfish flour in 'Puruluk' media towards Children, adolescent girls and women's Hemoglobin. Method: The type of research is a 2 group pre-post test experiment. The research used a cross over design. The subjects of this research were 90 people consisting of 30 teenagers, 30 adult women and 30 children in the Bungursari District area. Result: There was a significant difference between the Hb levels of children, teenagers and adult women who were given Tilapia Fish Puruluk compared to those who were given Catfish Puruluk. Giving catfish puruluk can increase Hb levels higher than tilapia puruluk in children, teenagers and adult women. There needs to be compliance in consuming "puruluk", especially among children, involving parents and school teachers

Keywords: Tilapia, Catfish, Puruluk, Anemia

1 INTRODUCTION

Unicef states that the prevalence of stunting in children under five in developing countries is 30%, Indonesia, which is a developing country, cannot be separated from this problem, stunting is a major nutritional problem, the prevalence in 2019 is 27.7% (Tanoto, 2021). The Indonesian government has launched the 1000 HPK program since 2013 and efforts to accelerate it in areas with high incidence rates with a target of reducing it from 27.7% in 2019 to 20% in 2024 (Ulfani et al, 2021)

Stunting will affect the quality of human resources in the future which will result in low productivity and income (A.Husna, F.Andika NR, 2020). In addition to malnutrition in mothers, other factors that can cause stunting are inadequate breastfeeding and complementary feeding, wrong parenting, infectious diseases, and other factors such as lack of family food security, poor economic conditions and access to health services (Lestari, W et al, 2018). The efforts made are basically improving nutrition for 1000 HPK, Personal Hygine and implementation of exclusive breastfeeding. Indonesian society consists of multi-ethnic cultures and geographic regions with different food sources and food patterns (Arini AH, 2021). Protein sources are very necessary for growth and development, but the diet and food sources of an area sometimes place a lot

of more consumption on carbohydrates such as rice. Protein based on its source, namely animal and vegetable protein. Based on its nutritional value, the nutritional value of protein is determined by its essential amino acid levels. The complete number of amino acids can be found in protein sources (Salman Y, Syainah E, RR, 2018). The national average of protein consumption per capita per day is 55.5 grams. As many as 16 provinces, including the province of West Java, have an average PPKPH consumption below the national average.

Bungursari District, Tasikmalaya City, West Java Province has three sub-districts with a high incidence of stunting in 2022, namely 13.48% for Bungursari sub-district, the prevalence in Cibunigeulis sub-district is 22.98% and Sukarindik sub-district is 20.37% anemia in mothers and expectant mothers is still high (50%). Bungursari District, Tasikmalaya City, West Java has fishery resources that are used as a livelihood for the community, but cannot yet be utilized to become nutritionally processed food products. The lack of knowledge and skills of residents in processing fishery products into product variants that have good nutritional value and high selling value makes people who only sell fishery products. The potential for processed fish with appropriate technology can improve the economy of the surrounding community and help with nutritional intake to support the nutritional status of adolescents, prospective brides, PUS, infants and toddlers so as to reduce and prevent stunting (Byrd KA et al, 2022)

The development of the use of tilapia and catfish product forms into flour is one form of effort to increase the variety of types of food sources of high protein. The development of food variations from flour can be used both for preventing anemia, improving the nutritional status of adolescents, PUS, as well as being used as complementary foods and snacks for toddlers. The city of Tasikmalaya is famous for snacks that use lots of flour-based ingredients such as “Puruluk” fish flour. In 2022 researchers conducted research on the development of the use of tilapia and catfish product forms into “Puruluk”. With this background, researchers are interested to analyze the differences between “Puruluk Tilapia” and “Puruluk Catfish” in increased Hemoglobin levels in children, adolescents and adults.

2 METHOD

The type of research is a 2 group pre-post test experiment. The research used a cross over design. The subjects of this research were 90 people consisting of 30 teenagers, 30 adult women and 30 children in the Bungursari District area. The object of this research is "Puruluk" which is processed A1 Tilapia fish flour (25gr), A2 catfish flour (25gr) from the weight of the main ingredients. Before the intervention, respondents had their Hb measured. Then the Tilapia Fish Puruluk intervention was given to group I, and Catfish Puruluk to group II for 1 month. After administering the intervention, Hb levels were measured again.

Data analysis was carried out using Paired sample t-test and Independent Sample T-Test. Independent Sample T-test is a significant parametric test used to compare the average scores of two different or independent groups to determine the Hb levels of those consuming tilapia Puruluk and catfish Puruluk.

3 RESULTS

Table 1. Hb Level Test Results Before and After being given Tilapia Fish and Catfish"Puruluk" in the Children's Group

Measurement Time	Group I (Tilapia Fish "Puruluk")	Group II (Catfish "Puruluk")	p-value
Pretest			
Mean	10,411	9,935	0,06**
Min	8,7	9,4	
Max	12,2	12,9	
SD	1,340	1,243	
Postest			
Mean	10,707	10,689	
Min	9,8	9,3	0,040**
Max	14,9	15,3	
SD	2,279	2,035	
p-value	0,048*	0,035*	
Hb Levels Increase			0.030**

*Paired T-Test
** Mann Whitney

The results of the analysis showed that there was an effect of giving Puruluk tilapia and catfish in increasing adolescent Hb levels (p value <0.05). The difference in mean Hb levels between the tilapia and catfish groups showed that there was a significant difference between the two groups (p-value <0.05). The average increase in Hb levels in the catfish group was higher than in the tilapia group.

Table 2. Hb Level Test Results Before and After being given Tilapia Fish and Catfish"Puruluk" in theAdolescent Group

Measurement Time	Group I (Tilapia Fish "Puruluk")	Group II (Catfish "Puruluk")	p-value
Pretest			
Mean	11,354	10,322	0,054**
Min	10,1	9,9	
Max	12,2	12,9	
SD	1,340	1,243	
Postest			
Mean	12,725	11,775	
Min	11,7	10,3	0,033**
Max	14,9	15,3	
SD	2,279	2,035	
p-value	0,023*	0,012*	
Hb Levels Increase			0.025**

*Paired T-Test
** Mann Whitney

The results of the analysis showed that there was an effect of giving Puruluk tilapia and catfish in increasing adolescent Hb levels (p value <0.05). The difference in mean Hb levels between the tilapia and catfish groups showed that there was a significant difference between the two groups (p-value <0.05). The average increase in Hb levels in the catfish group was higher than in the tilapia group.

Table 3. Hb Level Test Results Before and After being given Tilapia Fish and Catfish"Puruluk" in the Adult Women Group

Measurement Time	Group I (Tilapia Fish "Puruluk")	Group II (Catfish "Puruluk")	p-value
Pretest			
Mean	9,324	10,665	0,059**
Min	8,9	8,8	
Max	12,2	12,9	
SD	1,340	1,243	

Postest			
Mean	10,115	11,834	
Min	9,8	10,3	0,036**
Max	14,9	15,3	
SD	2,279	2,035	
p-value	0,031*	0,025*	
Hb Levels Increase			0.035**

*Paired T-Test
** Mann Whitney

The results of the analysis showed that there was an effect of giving Puruluk tilapia and catfish in increasing Hb levels in adult women (p value <0.05). The difference in mean Hb levels between the tilapia and catfish groups shows that there are differences significant between the two groups (p-value <0.05). The average increase in Hb levels in the catfish group was higher than in the tilapia group.

4 DISCUSSION

4.1 Description of Hb Levels in Children

This study found that there was an increase in the average hemoglobin level value after the intervention, which shows the impact of giving Puruluk Tilapia and catfish. If in the KLP I pre-test the children were fed tilapia, the average hemoglobin level value in the children was equal to 10.411g/dLSo after the intervention the average hemoglobin level was 10,707g/dL. Thus, by administering cookies, the hemoglobin category from anemia increases to normal. In the KLP II pre-test of children with catfish, the average hemoglobin level value in children was equal to 9.935g/dLSo after the intervention the average hemoglobin level was 10,689g/dL. Thus, by administering flour, hemoglobin levels increase.

From the pre-test carried out, there was still a lot of anemia occurring in young women. This is in line with the prevalence of anemia in Indonesia based on 2020 data, which reached 48.9%. From the data, the percentage of women dominates the anemia rate at 23.9% and the most is at the age of 5-14 years, namely 26.4% (Kemenkes RI, 2020).

The increase in hemoglobin levels after being given puruluk from tilapia and catfish is in line with previous research that there was an increase in the hemoglobin levels of adolescent girls after being given snack bars made from nagara peanut flour and haruan fish with hemoglobin levels before the intervention of 11.65g/ dL and after intervention it increased to 12.69g/dL (Jl Leroy EF, 2019)

After giving puruluk, there were still many respondents with hemoglobin levels <12g/ dL. This could be because each person's absorption of iron is different, this is influenced by the dietery regulator, namely after giving iron, the absorptive cells will be resistant to iron absorption for some time.
Tilapia and catfish puruluk can be a distraction or additional food for children Maulu S et al, 2021). During the giving, the average respondent had finished the puruluk given. The level of compliance in consuming puruluk greatly influences the hemoglobin levels of adolescent girls to prevent anemia. Each respondent has a different level of compliance with consuming Puruluk fish. The more obedient or routine the respondent is, the more aware he or she will be that preventing anemia is very beneficial for health. With this awareness, it will form aconcern especially for one's own health in preventing anemia. The factor that causes the puffiness to not be optimal is that there is still a distinctive fish smell in the product which according to some children makes them a little nauseous. The fishy taste and aroma of fish is the reason why children do not choose fish as a source of animal protein. This is exacerbated by the economic condition of the community, which is generally lower middle class, which is also one of the factors in the low fish consumption of elementary school students, even though the availability of fish in the surrounding environment is sufficient. Apart from that, knowledge factors also influence the desire to consume fish (Hadinot S, Idrus S, 2018; Jayadi YI, Rahman A, 2020). If we want people to like eating fish, it is necessary to increase knowledge, so that they know the positive benefits of consuming fish for health (Salman Y, Syainah E, RR, 2018; Cahyati DP, Simanjuntak BY, 2020; Lastriyanto A, Argo BD, Pratiwi RA, 2019)

The results of the dependent t-test statistical test obtained a p-value (0.048) for tilapia puruluk and a p-value (0.035), so it can be concluded that there is an effect of giving tilapia and catfish puruluk on children's hemoglobin levels.

This research is in line with other research concluded that providing snack bars with Nagara peanut flour and haruan fish can increase hemoglobin levels in adolescent girls. This research was carried out for 1 month by giving 50 grams of Nagara peanut flour and haruan fish snack bars 3 times a week. The result was a p-value of 0.016 which showed that there was an effect of giving snack bars made from haruan fish meat and Nagara nuts on hemoglobin levels (Syahwal S, Dewi Z, 2018)

4.2 Description of Hb Levels in Adolescent

This study found that there was an increase in the average hemoglobin level value after the intervention, which shows the impact of giving Puruluk Tilapia and catfish to young women. If in the pre-test Group I children with tilapia fish the average hemoglobin level value in young women is 11.354g/dLSo after the intervention the average hemoglobin level was 12,725g/dL. Thus, by administering cookies, the hemoglobin category from

anemia increases to normal. In the Group II pretest for young women with catfish, the average hemoglobin level value for young women was 10.322.g/dLSo after the intervention the average hemoglobin level was 11,775g/dL. Thus, by administering flour, hemoglobin levels increase. The results of the dependent t-test statistical test obtained a p-value (0.023) for tilapia puruluk and a p-value (0.012), so it can be concluded that there is an effect of giving tilapia and catfish puruluk on the hemoglobin levels of adolescent girls.

The increase in hemoglobin levels after administration of tilapia and catfish puruluk is in line with other research that increase the hemoglobin levels of female teenagers after being given anchovy biscuits had hemoglobin levels with a mean difference of 0.93 with a p value of 0.001 where p <0.05 which means there was a significant difference before and after being given the treatment (Thalibku et al, 2021)

After giving puruluk, there were still many respondents with hemoglobin levels <12g/ dL. This could be because each person's absorption of iron is different, this is influenced by the dietery regulator, namely after giving iron, the absorptive cells will be resistant to iron absorption for some time (Diah D et al, 2019)
During the giving, the average respondent had finished the puruluk given. The level of compliance in consuming puruluk greatly influences the hemoglobin levels of adolescent girls to prevent anemia. Each respondent has a different level of compliance with consuming Puruluk fish. The more obedient or routine the respondent is, the more aware he will be that preventing anemia is very beneficial for health. With this awareness, he will form a concern, especially for his own health, in preventing anemia. Other research found that teenage girls who do not consume animal protein sources every day are more likely to suffer from anemia (Abbaspour N, et al., 2014)

Another factor that has an impact on Hb levels is the menstrual period experienced by the respondent. Research found that iron deficiency and menstruation were associated with the incidence of anemia in adolescents (Sari P et al, 2022; Gonete KA et al, 2018))

4.3 Description of Hb Levels in Adult Women

This study found that there was an increase in the average hemoglobin level value after the intervention, which shows the impact of giving Puruluk Tilapia and catfish to adult women. If in the pre-test klp I adult women with tilapia fish, the average hemoglobin level value in adult women is 11.354g/dLSo after the intervention the average hemoglobin level was 12,725g/dL. Thus, by administering cookies, the hemoglobin category from anemia increases to normal. In the KLP II pre-test for adult women with catfish, the average hemoglobin level value in children was 10.322.g/dL So after the intervention the average hemoglobin level was 11,775g/dL. Thus, by administering tilapia and catfish flour, hemoglobin levels increase. The results of the dependent t-test

statistical test obtained a p-value (0.031) for tilapia puruluk and a p-value (0.025), so it can be concluded that there is an effect of giving tilapia and catfish puruluk on the hemoglobin levels of adult women.

The results of the study are in line with other research, there was a change in hemoglobin before and after in the intervention group. In the intervention group, the median value before administration of anchovy and moringa biscuits was found to be 9 (7-12) and experienced an increase in the median value to 11 (11-12). The results of the Wilcoxon test in the intervention group obtained a value of $p = 0.000 < \alpha = 0.05$. So it can be concluded that there was an effect of giving anchovy biscuits and moringa on increasing hemoglobin in the intervention group (Syarfani AS et al, 2019; Fauziah, D., & Siauta, J. A, 2022; Egbi G et al, 2018)

The diet of adult women is related to the lack of iron in food, in a week the majority of respondents eat more vegetable protein than animal protein around 57.3%, not sure about consuming fruit around 70.2%, eating vegetables cooked properly around 57.3%. 34.7% . Monthly menstrual cycles, pregnancy, lack of food intake containing iron, parasite infections and worms are thought to be factors that trigger anemia in women (Weldekidan F et al, 2018; Argaw D et al, 2020)

5 CONCLUSION

There was a significant difference between the Hb levels of children, teenagers and adult women who were given Tilapia Fish Puruluk compared to those who were given Catfish Puruluk. Giving catfish puruluk can increase Hb levels higher than tilapia puruluk in children, teenagers and adult women. There needs to be compliance in consuming “puruluk”, especially among children, involving parents and school teachers.

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