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Effectiveness of The Provision of Snakehead Fish Nuggets and Colored Fruit Extracts to Blood Protein (Total Protein, Albumin, HB) in PLHIV

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Abstract. The problem of the high prevalence of HIV/ AIDS and its development in the world and in Indonesia is like the iceberg phenomenon. The discovery of HIV / AIDS cases in Dubai reached 1.8 million, of which 940,000 people died of AIDS. Meanwhile, in Indonesia, the discovery of new cases (2016) in Riau Province was around 6,885 cases, Jakarta had 35,947 cases, Papua reached 31,846 cases and North Sumatera had 7,890 cases. This study aims was to determine the effectiveness of the provision of snakehead fish nuggets and colored fruit extracts to blood proteins (total protein, albumin and hemoglobin) in people with HIV (PLHIV). This type of research was Quasi-Experimental with Pre and Post Test Design. This design allowed researchers to measure the differences in total protein, albumin and Hb in PLHIV before and after the intervention of the provision of snakehead fish nuggets and colored fruit extracts. This research was conducted for 22 days, while the sample selection used total sampling technique. The research location was carried out at Bahagia Social Rehabilitation Center of Medan. The results showed that there was an effect of the provision of snakehead fish nuggets and colored fruit extracts on total protein ($p = 0.036$), albumin levels ($p = 0.000$) and Hb levels ($p = 0.001$) in PLHIV. The conclusion of this study that there is a change in blood protein (total protein, albumin, Hb) in PLHIV after being given snakehead fish nuggets and colored fruit extracts.

1. Introduction

Acquired Immune Deficiency Syndrome (AIDS) is a collection of symptoms or infections caused by the Human Immunodeficiency Virus (HIV). HIV is a virus that attacks the immune system, causing a decrease in the patient's immune system [1]. Adequate nutritional intake is essential for maintaining the immune system to maintain physical activity levels and for optimal quality of life. People infected with HIV often experience impaired eating disorders so that the nutrient intake lower, which will causes the decreased of physiological body function. The changes in clinical conditions are not only caused the disruption of the entry of nutrients, but also caused psychological problems [2].

People with HIV/AIDS will experience a catabolic process, where there is a faster breakdown of proteins which results in lower blood protein concentrations [2]. Blood protein consists of total protein, albumin and Hb. Blood protein is part of the body's immune substance (anti-body), so it is needed to defend the body against infection. Protein can replace damaged cells caused by high metabolic stress caused by the HIV/ AIDS virus [3].

Total protein consists of two main groups of protein in the blood, namely albumins and globulins. Total protein is a picture of protein degradation in the body, where a decrease in protein intake can cause



weight loss. Low levels of total serum protein are an indication of poor nutritional status due to insufficient availability of essential amino acids [4].

One of the most frequent haematological problems often found in people with HIV/ AIDS is low hemoglobin levels. This causes the oxygen carrying capacity to be unable to meet the body's physiological needs. The cause of low Hb levels, in addition to the side effects of the disease, also caused by disruption of the process of food intake and disruption of the gastrointestinal tracts (GIT). The derivation of Hb levels will accelerate another opportunistic disease, so that PLHIV be more susceptible infected by disease. The decrease in oxygen supply to tissues causes metabolism to be disturbed and the body's energy production decreases so that the patient feels tired quickly [5].

Snakehead fish can be processed into a variety of foods such as meatballs, shredded fish, snakehead fish extracts and nuggets which can be used as an alternative food source of protein. Snakehead fish contains immunonutrient elements such as very high albumin protein, animal antioxidants, complete essential amino acids and minerals Zn, Fe, which functions to repair damaged body tissue cells, improve nutritional status and increase endurance, scavenge radicals and play a role in the process cleaning as well as capture of ROS [3][6].

Snakehead fish nuggets contain high levels of zinc and function to accelerate the healing process of diare, which is related to the role of zinc in cell proliferation. In addition, it also has a high enough Fe content so that it can be the basic material for the formation of hemoglobin. The results of research [2] in 2015 and research [7] in 2017 where the provision of snakehead fish treatment in various forms of presentation turned out to increase super oxide dismutase (SOD), albumin levels and zinc levels in patients.

The provision of snakehead fish nuggets is expected to be able to meet the need of protein for people who have infectious diseases where this need ranges from 75-100 grams per day. Snakehead fish nuggets given per 100 grams are very suitable as a snack because they can meet 15-20% of protein needs. The provision of snakehead fish nuggets will be better combined with other functional foods such as colored fruit extracts. Colored fruit extracts is a functional food that contains bioactive substances in the form of carotenoids and flavonoids found in papaya, red guava, dragon fruit, banana, tomato, pineapple, mango, watermelon and several yellow, green, purple and red foods. Pineapple juice with its bromelain enzyme content has great potential to reduce the pain of people with HIV/ AIDS. Apart from pineapple fruit, papaya also contains papain enzyme which has the property of increasing the immune system by strengthening immunoglobulins [8].

The provision of snakehead fish nuggets and colored fruit extracts was given at *Bahagia* Social Rehabilitation Center for People with Human Immunodeficiency Virus Acquired Immunodeficiency Syndrome. In this study, a total sampling was used in which all people with HIV who were rehabilitated at *Bahagia* Social Rehabilitation Center of Medan.

The uniqueness of this study was that the snakehead fish nuggets and compound with red beans are easy to make, suitable as a snack and contains high Zn in increasing the body's immune response. These nuggets also contain other special nutrients to suppress the inflammatory process so that virus development is lower. As for colored fruit extracts, the researchers took advantage of all parts of the colored fruit that are easily available, affordable and contain a special feature, namely its high bioactive substances. The aim of this study was to assess and analyze the effect of snakehead fish nuggets and colored fruit extracts on blood protein in PLHIV.

2. Methods

2.1 Types and Research Design

This research was Quasi - Experimental study with one group pre and post-test design. With this design using a group of subjects and take measurements before and after giving treatment to the subject [9].

2.2 Location and Time

This research was conducted at *Bahagia* Social Rehabilitation Center of HIV/ AIDS in Medan. This research on giving treatment to PLHIV was carried out for 22 consecutive days directly by researchers assisted by 7 enumerators, namely on 27th June – 18th July 2019.

2.3 Population and Sample

The population in this study were all PLHIV in the *Bahagia* Social Rehabilitation Center in Medan. The sample in this study the entire population was used as a sample, called the total sampling, which amounted to 36 people.

2.4 Measurement of Total Protein Levels

Measurement of total protein levels by taking the blood of people with HIV as much as 2.5 cc before and after snakehead fish nuggets and colored fruit extracts provision using the Biuret method using a spectrophotometric instrument. Total protein is usually measured with Biuret's reagent with alkaline copper sulfate. The absorption was monitored spectrophotometrically with a wavelength of 545 nm [9].

2.5 Measurement of Albumin Levels

Measurement of blood albumin levels is obtained by taking blood samples before and after the provision of snakehead fish nuggets and colored fruit extracts through a 2.5 cc syringe (syringe), using the BCG (Brom Cresol Green) method which is inserted into the vein in the arm using the Brom Cresol Green (BCG) method used a shimadzu UV-100-02 spectrophotometer [10].

2.6 Measurement of Hemoglobin Levels

Measurement of hemoglobin levels was obtained by taking blood samples before and after the provision of snakehead fish nuggets and colored fruit extracts using the Cyanmethemoglobin method and a Spectrophotometer. Blood was drawn using a 2.5 cc syringe which was taken from the left arm which had been cleaned beforehand which was taken by a health analyst. Then the blood is put into a tube containing EDTA (Ethyl Diamine Tetra Acetic acid) solution to avoid the blood clotting process. Then the results are taken and checked by health analyst to check the Hb levels. Read the results using a spectrophotometer.

2.7 Providing Treatment of Snakehead Fish Nugget and Colored Fruit Juices

The snakehead fish nuggets were given once a day (2 pieces each time, where the weight of each piece was 50 grams) while the colored fruit extracts was given once a day as much as 250 ml (1 cup glass). Consumption of snakehead fish nuggets and colored fruit extracts was supervised by direct researchers and officials from Social Rehabilitation Center.

2.8 Data Analysis

The data analysis consisted of univariate and bivariate using the dependent T-test (paired), after previously having tested the data normality with the Kolmogorov Smirnov test. This research has obtained the approval of the research ethics commission in the health sector of the Medan Health Polytechnic of Ministry of Health with no: 044 / KEPK/POLTEKKES KEMENKES MEDAN/2019.

3. Results and Discussion

3.1. Sample Characteristics

Sample characteristics include age, gender and education, amounting to 36 people. The percentage of the sample age was dominated by age group of 30- 39 years old as much as 52.7% (19 people), with the youngest age being 20 years and the oldest being 54 years old. The percentage of the most dominant gender was male as much as 66.6% (24 people). The percentage of education in the sample mostly has education at the latest sample, most of them have high school education as many as 22 people (61.1%). Sample characteristics can be seen in Table 1.

Table 1. Distribution of sample characteristics

Sample Characteristics		Total	
		N	%
Age	20-29 years old	4	11.11
	30-39 years old	19	52.78
	40-49 years old	12	33.33
	>50 years old	1	2.78
Gender	Male	24	66.67
	Female	12	33.33
Education	SD (Elementary)	2	5.56
	SMP (Junior High School)	2	5.56
	SMA (Senior High School)	22	61.11
	College Level	10	27.77

3.2. Total Protein, Albumin, and Hb Levels Before and After Treatment.

The average values of total protein, albumin, and Hb levels before and after treatment can be seen in Table 2.

Table 2. Distribution of albumin, total protein, and hb levels

Indicator		N	Min	Max	Mean	Deviation Std.	p
Protein Total Level	Before	36	5.90	8.80	7.814	0.64105	0.014
	After	36	6.10	8.80	8.00	0.58015	
Albumin Level	Before	36	3	5	4.22	0.488	0.001
	After	36	4	5	4.32	0.418	
Hb Level	Before	36	9.6	16.80	13.822	1.658	0.001
	After	36	10.20	16.00	13.447	1.464	

Table 2 showed that the total protein content of 36 PLHIV samples found that the average total protein content before treatment was 7.813 and the average total protein content after treatment was 8. The average albumin level before treatment was 4.22 and the average level of albumin after treatment 4.32. Meanwhile, the average Hb level before treatment was 13.8 and the average Hb level after treatment was 13.44.

The results of the paired T-test value showed that there was an increase in the value of $p = 0.001$ $\alpha < 0.05$ so that H_0 was rejected where there was a significant difference before and after treatment, meaning that there was an effect of snakehead fish nuggets and colored fruit extracts provision on albumin levels.

3.3. Albumin Levels

In general, people infected with HIV/ AIDS have low serum albumin levels. The albumin content in snakehead fish nuggets is useful to help in metabolism and the formation of new tissues in the body. Albumin also plays a role in binding drugs and heavy metals that are not easily dissolved in blood [11]. The treatment of snakehead fish nuggets and colored fruit extracts can increase albumin levels in people with HIV ($p = 0.001 < 0.05$). Research [12] showed that as many as 85% of postoperative patients with

hypoalbumin in Graha Hita Room. By increasing albumin levels after administration of snakehead fish albumin, it can help the wound healing process by helping the formation of new tissue.

Snakehead fish contain of high albumin and protein and also a complete amino acid content. Albumin protein obtained from snakehead fish and egg white in nuggets which also contain ovalalbumin that has a role in increasing albumin levels. Snakehead fish and egg white also contain albumin which plays a role in zinc transportation, which can increase the body's immune response to infection [8][13].

Research at dr. Iskak Tulungagung hospital showed an increase in albumin levels after being given snakehead fish extract for 7 consecutive days. The results of the study [14] also stated that the horns of the HIV virus are made of protein, so that these horns can be damaged by enzymes that have proteolytics that can destroy protein. Colored fruit extracts consist of several fruits like papaya and pineapple, where is the papain enzyme derived from papaya and bromelain enzyme from pineapple have a stronger activity against to HIV virus, while vitamin C content in fruits help suppress free radicals and body's immune system.

3.4. Total Blood Protein Levels

Total protein is a biochemical test performed to determine nutritional status in HIV-positive people. It consists of two main groups of protein in the blood, namely albumins and globulins. Total protein is a reflection of protein degradation in the body, where a decrease in protein intake can cause weight loss and lead to malnutrition [4][14]. Total protein in blood, liver, and other organs has a half-life of between 2.5 and 10 days [14]. So that the provision of snakehead fish nuggets and fruit extracts was carried out for 22 consecutive days to increase total protein levels.

The results showed the value of $p = 0.014$ or $\alpha < 0.05$ that the treatment of snakehead fish nuggets and colored fruit extracts had a significant effect on total protein content. The increase in total protein levels after treatment was also caused by an increase in blood serum albumin. Changes in albumin levels will affect the total protein value, because serum albumin was 50% of total serum protein. [16]. snakehead fish nuggets contain high Zn which is obtained from the ingredients for making snakehead fish nuggets, including snakehead fish and red beans. The high Zn in snakehead fish nuggets will be able to increase the metabolic rate, especially protein so that it will affect blood protein [17].

The colored fruits extracts given to PLHIV contains of colored pigments and bioactive substances, apparently can prevent the inflammatory process of GIT and liver. This case will optimize liver function in increasing protein synthesis, even increase the pancreas function for trypsin and chymotrypsin enzyme secretion. Both of them have a role in protein metabolic process, so it will affect plasma total protein [17].

3.5 Hemoglobin Levels

The results showed the value of $p = 0.001$ or $\alpha < 0.05$, where there was an increase in Hb before and after being given treatment of snakehead fish nuggets and colored fruit extracts which could be associated with the presence of zinc content and bioactive substances in snakehead fish and colored fruit extracts that can restore immune function. By increasing the activity of the catalase enzyme and the superoxide dismutase (SOD) enzyme [2]. Snakehead fish contains animal protein that plays an important role in the transportation of iron in the body. It also contain micronutrients such as Fe and Zn, which are needed in the synthesis process in PLHIV.

Zinc and Fe nutrients in Snakehead fish play a role as a component in forming myoglobin (a protein that carries oxygen to muscles), collagen (a protein found in bone, cartilage and connective tissue). Fe also contributes to the body's defense system, whereas Zn is a micronutrient that can interact well in synthesizing various proteins including iron transport proteins, namely transferrin [18]. The working effectiveness of Zn can be combined with vitamin C derived from colored fruit extracts, where vitamin C plays a role in the formation of erythrocytes related to the function of vitamin C which accelerates the absorption of Fe from the intestinal mucosa and moves it into the bloodstream to the bone marrow which is then used for the formation of hemoglobin [19].

The results of a study [20] that proved the content of macro-micro nutrients in snakehead fish, such as albumin, zinc and animal antioxidants given in the form of snakehead fish extract have been shown to increase hemoglobin levels in people with HIV. The ingredients for hemoglobin found in snakehead fish contain a lot of iron (Fe) around 0.8 - 21 mg / kg and copper (Cu) 0.4 mg/ kg. Several other studies have stated that iron intake is a major component in the formation of blood hemoglobin, followed by vitamin C intake which will help the process of iron absorption [21].

4. Conclusion

Treatment of snakehead fish nuggets and colored fruit extracts have an effect on blood protein in PLHIV. This study found that treatment provision was able to increase blood protein levels. It is hoped that this research can be continued by competent parties in dealing with HIV/ AIDS issues and the recipients of the mandate can apply it in their daily lives by starting with the food sources that have been provided for its type.

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