45. Snakehead fish (Chana striata)

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Snakehead Fish (*Chana striata*) Powder Formulation for Increasing Calorie and Protein Intake in Malnourished Children

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ABSTRACT

Background: The cases of malnutrition in South Kalimantan are still high, and two districts which are included in the prevalence of undernourishment are South Hulu Sungai District and Batola District. This study aims to increase protein intake in children with malnutrition by giving additional input in the form of snakehead fish powder.

Method: The method of this study was quasi-experimental. This study used two groups with one treatment. The study was conducted at Berangas Health Center, Alalak Sub-District, Barito Kuala District, South Kalimantan. The research subjects were 50 people, with criteria for malnourished children under five who did not increase their weight scales in rows twice. The analysis used the t-test with the significance level used was $p < 0.05$.

Results: There was no difference in calorie intake between the group who received conventional toddler formula and the group who received the fish formula, and there was a difference in protein intake between the group who received conventional toddler formula and the group that received the recommended fish formula.

Conclusion:. The formula of snakehead fish is perfect for sufferers of malnutrition because the high protein in snakehead fish contains high levels of albumin that can improve cells and body tissues and help to boost growth in toddlers.

Keywords: *Malnutrition, toddlers, snakehead fish, South Kalimantan*

INTRODUCTION

Indonesia as a developing country still faces considerable nutritional problems. Malnutrition in children under five occurs because at that age more nutritional needs and toddlers are stages of maturity that are prone to nutrition. Lack of energy and protein is malnutrition due to low consumption of energy and protein in daily food, so it does not meet the nutrition adequacy rate.

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Protein deficiency is one of the leading nutritional problems that is often found in toddlers in Indonesia and other developing countries. Protein deficiency has an impact on growth, intellectual development, and productivity between 20 - 30%, while also having a direct effect on morbidity and mortality [(1)].

Based on Research data in 2013 cases of under nutrition in South Kalimantan were 8.2%, malnutrition 19.2% and tends to continue in recent years. This figure shows that cases of malnutrition in South Kalimantan are still high mainly in two districts: South Hulu Sungai District and Batola District. Malnutrition data in the Berangas Health Center in Alalak Subdistrict, Barito Kuala Regency up to June 2016 were: 1 malnutrition (0.045%), toddler (under the red line) 73 toddlers (3.3%)

and those treated in TFC (Therapeutic Feeding Center) as many as six people. This case increased compared to data in 2015, cases of malnutrition were one person (0.045%), toddlers 53 people (2.31%) and none were treated at TFC. In 2017, malnutrition continued to increase in Alalak District as many as 374 children under five (30.6%) with the highest nutritional status, namely in Beringin Village as many as 57 toddlers (16%) [2].

Nutritional therapy in malnourished children has a significant role in accelerating the healing of diseases. Errors in feeding will slow the healing of the disease. Excess or lack of nutrition can worsen the condition of the child, and can even cause death. Therefore, parents should be informed about the patient's rights in the care and feeding of malnourished children. Nutritional therapy for sufferers of malnutrition is applied in several phases, namely: the stabilization phase, the transition phase and the rehabilitation phase [3].

Various studies to improve nutritional status in sufferers of malnutrition including by providing snakehead fish extract which has a high albumin content can help increase albumin levels in patients with poor nutrition with low albumin levels below 2.5 mg%. Other studies also reported that the use of snakehead fish as a source of protein turned out to maintain the albumin value of patients hospitalized in the hospital so that it can help speed up the healing process of patients [4]. This study aims to determine the formula for fragrant fish to increase calorie intake and protein in children with malnutrition.

RESEARCH METHOD

This study was a quasi-experimental study, and this study used two groups with one treatment.. The research location was carried out at Berangas Health Center, Alalak District, Barito Kuala District, South Kalimantan. The subjects of the study were 25 control groups and 25 treatment groups with the criteria of malnourished children who did not increase their weight scales twice — respondent data consisting of name, age, gender. The data was collected by interviewing and filling out the questionnaire. Food intake data (formula of potatoes with snakehead fish) were obtained by talking the subject directly by using a 2x24 hour food recall form for two times a day. 2x24 hour food recall results were analyzed using *Nutri2008* — a different test using t-test. Toddler formula is a modification of the formula F 100 plus a special biscuit for toddlers. Snakehead Fish Formula is a modified formula for sufferers of malnutrition consisting of food ingredients: snakehead fish, potatoes, carrots, milk, vegetable oil, sugar, and salt.

RESULTS

The difference in calorie intake in the group of malnourished children under five who received formula toddler compared to the group of malnourished children under five who received the formula for snakehead fish was p = 0.079, which means there was no difference in calorie intake in the two groups. Differences in protein intake in the group of malnourished children under five who received formula toddler compared to the group of malnourished children under five who received snakehead fish formula was p = 0, 016 which means there is a difference in calorie intake in both groups.

Table 1. Calorie Intake Rate of Malnutrition Patients

Calorie Intake Rate Category	Toddler Formula Group		Snakehead Formula Fish Group		p-value
	n	%	n	%	
a. Over	17	68	7	28	
b. Good	5	20	5	20	
c. Mild Deficit	1	2	4	16	0.079
d. Moderate Deficit	0	0	2	10	
e. Severe Deficit	2	10	7	26	
Total	25	100	25	100	

Table 1 shows most levels of caloric intake in the group that received toddler formula were in over categories, namely 68% while in the group that received the formula for snakehead fish the biggest category was also over (28%) with p-value = 0.079.

Table 2. Protein Intake Under Nutrition Patients

Calorie Intake Rate Category	Toddler Formula Group		Snakehead Formula Fish Group		p-value
	n	%	n	%	
a. Over	11	44	14	64	
b. Good	12	48	6	16	
c. Mild Deficit	1	4	1	4	0.016
d. Moderate Deficit	0	0	2	8	
e. Severe Deficit	1	4	2	8	
Total	25	100	25	100	

Table 2 shows the level of protein intake in the group that received formula toddlers is mostly in the over category, which is 44%, while the group that gets the formula for snakehead the biggest category is also over (64%) with p-value = 0.016.

DISCUSSION

Optimizing the handling of nutritional problems in children under five can be done through diversifying the development of additional food formulas by considering the nutritional aspects, health benefits, acceptability, endurance and local food resource advantages —local food material, among others, in the form of snakehead fish (*Chana striat*) [5].

The advantages of snakehead fish include the womb protein is higher than other food ingredients such as eggs, chicken, and beef. Besides, collagen protein of snakehead fish is also lower than livestock meat, which ranges from 3-5% of total protein. Low collagen causes snakehead fish meat becomes easier to be digested by babies, elderly groups, and also people who just recovered from illness. [8]. Besides the snakehead fish is known as a fish that can heal wounds, reduce pain, and postoperative discomfort [9]. Many snakehead fish are caught in the area the waters of Kalimantan that are not far away from the community living area , and the processing is still limited to being dried fish or sold freshly. Potential of snakehead fish development for other purpose is big but if consumed directly there are still people who don't feel willing to consume because of the original head shape snakehead fish resembles a snake. If consumed fresh, it requires more seasoning because snakehead fish tastes plain. Processing of fish snakehead into flour can be an alternative in decreasing fishy aroma and enhancing acceptance and consumption of snakehead fish [10].

The level of caloric intake in toddlers who get formulas in the form of biscuits and milk, is more in the over intake category (68%), because the calorie content of cookies every 100 grams is 458 kcal, and in milk powder skim every 100 grams is 362 kcal. The form of food in the form of biscuits which are packaged in dry form becomes small portions, but the calorific value is high. The level of caloric intake in the group that received the formula for snakehead fish was much the same in the category of more consumption (28%) and the level of heavy deficit intake (28%). For comparison, 100 grams of potato contain 83 kcal, skim milk every 100 grams is 362 kcal and fragrant fish every 100 gram is 74 Kcal.

The level of protein intake in group I which received formula for toddlers was at most good intake categories (48%), and protein intake in group II who received the formula for the most type was 64%. The calorific value of fresh fish in 100 grams is 25.2 grams. Herring protein is also high in albumin. The high albumin content in snakehead fish causes this fish is used to overcome hypoalbumin [6].

Based on statistical tests (p = 0.079), there was no difference between group I calorie intake (toddler formula) and group II calorie intake (snakehead fish formula), and there was a difference between group I protein intake (formula toddler) with group II (fish formula snakehead) with a value of p = 0.016.

Calories in toddler formulas are given according to the condition and condition of toddlers' weight of malnutrition, formula F 100 containing 1000 kcal, protein 29 grams plus 30-gram biscuits at 137.4 kcal, protein 6.9 grams so that it amounts to 1137.4 kcal and 35, 9 grams of protein. This can increase calorie and protein intake for all malnourished toddlers. The formula, F 100 consists of 50 grams of sugar, 60 grams of vegetable oil, 80 grams of skim milk, added mineral mix and water could be in the form of a gel, so that it is diluted plus water and stirred until homogeneous, making it easy to consume. The number of Calories in a fragrant fish formula with a composition of 200 grams of potatoes, 10 grams of sugar, 20 grams of skim milk, 50 grams of harp fish, 30 grams of carrots, and 10 grams of vegetable oil for two recipes are 1142 Kcal and 36.6 grams of protein.

The value of calories and protein that are not different in the two formulas can be a reference for giving formulas to better sufferers of malnutrition. The difference in protein intake is more significant in the group that gets the formula for snakehead fish can be provided more often for sufferers of malnutrition. Snakehead fish that have high protein values also contain high albumin, and its function is to maintain fluid balance in the body that can prevent edema [7]. Another feature of albumin is to help the formation and repair of cell tissue in the body for the development and growth of thermal children [8].

Snakehead fish has a very high protein content of albumin, the results of the study revealed that in the nutritional content of snakehead fish there was 6.2% albumin. Albumin is a type of protein that is found in 60% of human blood plasma whose function is to maintain and improve tissue and improve health in patients with malnutrition and poor nutrition [4].

CONCLUSION

There is no difference in calorie intake in the group that received formula toddlers with a group of toddlers who received formula of fragrant fish. There was a difference in protein intake in the group that received formula toddlers with a group of toddlers who received formula of fragrant fish. The formula of snakehead fish is perfect for sufferers of malnutrition because high protein snakehead fish also contains high levels of albumin that can improve cells and body tissues and help to enhance the growth of toddlers.

Ethical Clearance: This study has been conducted an ethical review by the Banjarmasin Ministry of Health Polytechnic Research Ethics Commission with No. 257 / KEPK-PKB / 2018. We also wish to thank all the participants who contributed to this study.

Conflict of Interest: Nil.

Source of Funding: Nil.

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