ACCEPTABILITY AND NUTRITION INGREDIENTS OF TEMPEH STICK WITH ANCHOVY FLOUR ADDITION

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ABSTRACT

Nutrition is an important factor for realizing human in Indonesia. Various studies have revealed that malnutrition, especially among children under five of early age will have an impact on child development. In this case, soybean flour stick added with anchovies expected to be a high-protein alternative food for calcium and zinc. The problems of this study are how the acceptance and nutrient content of tempeh sticks with the addition of anchovies flour. The aim of this study is to determine the acceptability and protein, calcium and zinc with the highest percentage of received power in tempeh sticks with the addition of wet fish meal. This research is an experimental research post test group design. Untrained panelists used are 30 students. A statistical analysis of the test using One-Way ANOVA and advanced analysis using the Tukey. Results from this study is the most preferred product is the addition of 15% and a protein content of 15% with the addition of 25.9 g, 2316.11 calcium levels (ug / g), 0.505 zinc levels (ug / g). The study also showed that the addition of anchovy flour real impact on the aspect of color, aroma and flavor. Further studies are expected to do more research on how to reduce aroma and texture of sand on fish meal.

Keywords: Acceptability, Analysis of Calcium, protein and zinc , Anchovy Flour.

INTRODUCTION

Nutrition is an important factor for realizing human in Indonesia. Various studies have revealed that malnutrition, especially among children under five of early age will have an impact on children development. Children who are malnourished will grow short, thin and small compared to normal children, this will affect the child's cognitive ability and intelligence. (MOH, 2014)

Riskesdas on 2013 showed that nationally, the prevalence of malnutrition in 2013 is 13.9%. Of the 33 provinces, South Sulawesi ranks 10th highest stunting. The survey results of Nutritional Status Monitoring (PSG) in 2017, the nutritional problem in Indonesia are 17.8% had less nutritional status, 29.6% nutritional status short, 9.5% underweight and based on nutritional status according to the index TB / U in South Sulawesi as much as 10.2% children have very short nutritional status and 24.6% children have short nutritional status. While in the city of Makassar 7.5% children are very short, 17.7% are short and 64.3% are normal.

The inhibition of body growth is one form of malnutrition characterized by the child's height for age (Tb / A) under the standard deviation (<-2 SD) (WHO, 2005). There are many risk factors that cause stunting, such as body length at birth, food intake, diseases and infection, genetic and family socioeconomic factors (Kusuma, 2013). The incidence of stunting in children caused by several factors, especially micronutrient deficiencies (Gibson, 2005).

Deficiency of micro and macro nutrients dietary intake in children aged 1-3 years greatly affect the growth and development in children (MOH, 2009). According to Bahmat et al. (2012), the lack of macronutrients and micronutrients intake such as zinc and calcium that are not in accordance with the requirements can lead to stunting.

Indicators of nutritional status based on index TB / U give an indication of the chronic malnutrition nature as a result of circumstances that lasts longer. For example: poverty, unhealthy lifestyle behaviors and dietary intake is less in the long term since the age of the baby, even since the fetus, resulting in the child being short.

Efforts to improve the health and nutritional status through the behavior of people with supplementary feeding, which is part of an effort to improve nutrition. One of the various steps and continuous efforts

made by the government is one supplementary feeding (PMT) to infants in the form of supplementary feeding with local food. Local food based approach is an effective way to address nutritional problems, one of which uses marine products.

Indonesia has abundant marine wealth, is rich in marine biotic resources (physical and chemical components of the ecosystem nonliving) and abiotic (living components of the ecosystem). Biotic resources in the sea contained more than there are in the mainland because the ocean area reaches 70% of the earth are biological resources that have great potential for biotechnological applications, and food (Venugopal, 2010). Wealth biotic marine resources in the form of fish are widely used by people as a food source.

Fish as a source of animal protein should be utilized as much as possible to meet human needs. Therefore, the fish can be used as fishmeal. Including the remains of processed (waste) or excess of the catch to be processed into fishmeal (Liviawaty et al., 2011). The composition of the water content in fish 60.0% - 84.0%, protein 18.0% - 30.0%, fat 0.1 to 2.2%, carbohydrates 0.0 to 1.0%, vitamins and the rest is mineral. (Adawyah, R, 2008)

Based on the description above, efforts to improve the nutrient content in tempeh stick then the addition of wet fish meal. Wet fish is a small fish species with high economic value such as other marine fish species. Anchovy has a small body so that all sources of nutrients contained in the body can be utilized by humans (Isnanto, 2012).

Wet anchovy is a popular fish among the public, anchovy is a species of fish that have a fairly high economic value. Commonly traded anchovy types are rice anchovy, smooth anchovy, and jangki anchovy. Anchovy can be processed into various products, such as salted fish, fresh anchovies and anchovies plate. (Astawan, 2008).

Fishmeal is a source of protein that has been adapted either by fish, in addition to rich in essential amino acids, the fat content of the fish meal is a high-quality energy source. Fish meal has a high protein content and is one important component in the growth. Fish flour has nutritional value ten times greater than flour made from land animals. The use of fishmeal in the product functioned as a supplier of protein (Irianto and Giyatmi, 2009)

The quality of traditional snacks can be enhanced by nutrients nutrification into the food. Nutrification is adding a macronutrient and micronutrient into snack food. Nutrification techniques done through a combination of macronutrients and micronutrients in food so produced nutritious foods. One of the macro-nutrients commonly added in foodstuffs are proteins.

Fish meal made from anchovies can be a form of foodstuffs. In addition to having a long shelf life compared to fresh fish, anchovy flour is expected to have more flexible utilization. The use of wet anchovy flour as supplementary material in the manufacture of tempeh stick can complement its nutrition, especially protein and calcium.

Preliminary research that has been done by taking consentrations of flour anchovy found that the manufacture of stick tempeh with a concentration of 10% anchovy flour obtained satisfactory results and 15% concentration resulted distinctive fish aroma that began to be felt. Meanwhile, a concentration of 20% of anchovy flour resulted the flour aroma cannot be smelled because the smell of fish is very strong, and it changed the color of the stick tempeh golden brown turn into grayish brown, the results of 30%concentration are not satisfactory because typical fish aroma was smelled, the color of the flour is also less attractive because it turned into gray ash. The concentration will be made of various concentrations such that include 10%, 15% and 20% to do a test.

RESEARCH METHODS

Design, Place and Time

This type of research is experimental research with study design used is a post-test group design. This research was conducted at the Laboratory of Food Technology, Center for Health Laboratory of Makassar. This research was conducted in January to May 2019.

Materials and tools

The materials used for the manufacture of anchovy flour are limes and anchovies. Materials used to manufacture stick tempeh are tapioca flour, wheat flour, butter, tempeh, baking powder, salt, eggs, cooking oil and lime leaves.

The tools used to manufacture anchovy flour and stick tempeh are pan as a container for mixing the ingredients, blender, scales stove, pan, cabinet dryer, steamer pot and strainer 60 mesh, wood Sutil, frying pan and rolling pin. as cookware and anchovy powder manufacturing. Tools that are used for analyzing protein, calcium and zinc are Erlenmeyer flask, beakers, glass beaker, pengadung rod, spatula, pumpkin reflux, a pipette, and a hot plate.

Research Steps

Stick Tempe and anchovy flour manufacture conducted at the Laboratory of Food Technology Nutrition Department of Health Polytechnic Makassar. Product acceptance carried out in the Laboratory of Nutrition Department of Health Polytechnic computer Makassar. Then the content of substances Nutritional analysis conducted at the Center for Health Laboratory Makassar. Data from the received power at test analysis using SPSS with One-Way ANOVA followed by Tukey analysis. Analysis of calcium and zinc produced in the form of a 5 gram sample and 100 g protein samples

RESULTS

Acceptability

Table 1. Distribution Accepbility to Aspect Color Stick Tempe with the addition of flour Anchovy Wet

Concentration	Thank power						p
	Like		Do not like		Total		
	n	%	N	%	n	%	
0%	12	40%	18	60%	30	100	0.038
10%	17	56.6%	13	43.3%	30	100	
15%	17	56.6%	13	43.3%	30	100	
20%	9	30%	21	70%	30	100	

Source: Primary Data, 2019

Table 1 shows that the received power panelist to tempe stick with the addition of flour anchovy based color the most preferred aspect panelist is a concentration of 10% and 15% with 16 panelists (56.6%)

Table 2. Distribution Accepbility to Aspect Aroma Tempeh Stick with the addition of flour Anchovy Wet

Concentration	Thank power						p
	Like		Do not like		Total		
	n	%	N	%	n	%	
0%	16	53.3%	14	46.6%	30	100	0,004
10%	8	26.6%	22	73.3%	30	100	
15%	19	63.3%	11	36.6%	30	100	
20%	22	73.3%	8	26.6%	30	100	

Source: Primary Data, 2019

Table 2 shows that the received power Tempe panelists to stick with the addition of flour anchovy based aspects of the most preferred scents panelist is a concentration of 20% to 22 panelists (73.3%) and were not favored by the aroma aspect is the addition of anchovy powder with a concentration of 10 % to 8 panelists (26.6%).

Table 3. Distribution Acceptability to Aspect texture Stick Tempeh with the addition of flour Anchovy Wet

Concentration	Thank power						p
	Like		Do not like		Total		
	n	%	N	%	n	%	
0%	20	66.6%	10	33.3%	30	100	0.056
10%	25	83.3%	5	16.6%	30	100	
15%	25	83.3%	5	16.6%	30	100	
20%	19	60.3%	11	36.6%	30	100	

Source: Primary Data, 2019

Table 3 shows that the received power panelist to tempe stick with the addition of anchovy based powder texture of the most preferred aspects of the panelists was a concentration of 10% and 15% with 25 panelists (83.3%) and were not favored by the texture aspect is the addition of flour anchovy with a concentration of 20% dengan19 panelists (60.3%).

Table 4. Distribution Acceptability to Aspect Taste Flour Stick Tempeh with the addition of Anchovy Wet

Concentration	Thank power						p
	Like		Do not like		Total		
	n	%	n	%	n	%	
0%	7	23.3%	23	76.6%	30	100	0,000
10%	11	36.6%	19	63.3%	30	100	
15%	29	96.6%	1	3.3%	30	100	
20%	19	63.3%	11	36.6%	30	100	

Source: Primary Data, 2019

Table 4 shows that the concentration of the addition of anchovy fish meal are preferred from the aspects of the flavor that is a concentration of 15% by 29 panelists (96.6%) and the least preferred is a concentration of 10% by 7 panelists (23.3%).

Table 5. Substance Content Analysis Table Nutrition Stick Tempeh with the addition of flour Anchovy Wet 15%

Samples	protein (%)	Calcium (mg / g)	Zn (Ug / g)
Stick Tempe 15%	24.9	2316.11	0.505

Source: Primary Data Test Laboratory, 2019 (Center for Health Laboratory Makassar)

Table 5 shows that the nutrient content of tempeh sticks with the addition of anchovies flour produce calcium as much as 2316.11 ug / g (2.31611 mg) and Zn 0.505 ug / g (0.0505 mg). While the content of nutrients in the form of as much as 24.9 grams of protein.

DISCUSSION

Color is the impression produced by the sense of sight to the light reflected by the object. Color is a very important aspect in the process of organoleptic tests, because the color of the first to respond to the five senses (eyes).

Based on the results showed that the highest preference level with a category like that is a concentration of 10% and 15% with 16 panelists (56.6%), while the lowest preference level is a concentration of 20% by 9 panelists (30%). Panelists less like adding flour anchovy concentration of 20% due to the resultant color is darker than the concentration of 10% and 15% so that the panelists are not interested in the product with konstentrasi 20%

Results One-Way ANOVA analysis showed the P value> 0.05 (0.038), which means that there is a difference from the color aspect with four kinds of concentration. Based on advanced test Tukey, concentration showed a difference in the concentration of 10% to 20% while the concentration showed no difference of 0% and 15%. This happens because then the higher level of concentration is added then the lower the preference level panelists.

This study is in line with research conducted, (Herliani, 2016), to study the effect of the addition of anchovies and drying temperature on the characteristic jerky stem taro stating that the color produced is not different between formula one another, due to each formula used differs which does not differ much. The brown color is due to the use of stem taro considerable and brown sugar that causes the Maillard reaction. The addition of anchovy in the making jerky taro stems also affects the color of the jerky. The color is influenced by the protein content in fish that causes the Maillard reaction.

In contrast to the results of research by (Astuti, 2010) of pastry flour anchovy receptivity to colors show no difference to the acceptability, pastries preferred is the addition of 10% and a bit like with the addition of 20% starch anchovy freshwater and research conducted by (Hidayati, 2015) about the influence of the concentration of flour anchovy in the manufacture of snack PMT and children against the protein content and organoleptic properties stated, there are significant concentrations of flour anchovy (Stolephorussp) in the manufacture of snack PMT toddler on the organoleptic properties of color, flavor, aroma and texture, based preference level test panelists concluded that the addition of flour anchovy concentration of 25% (F3) provide a good level of preference in all aspects.

Based on the research results with the addition of soybean flour stick anchovy

aspect aroma panelists preferred concentration is a concentration of 20% to 22 panelists (73.3%), 15% by 19 panelists (63.3%), and the concentration of 0% to 16 panelists (53.3%.) while the lowest preference level is the addition of concentration 10% by 8 panelists (26.6%)

The concentration of 0% and 10% has a distinctive aroma of butter, while at a concentration of 15% and 20% of the aroma of butter covered by the distinctive aroma of anchovy, resulting in a distinctive aroma of anchovy were firm and preferred by the panelists.

Based on the results of tempeh sticks with the addition of flour anchovies of different textures aspects with aspects of flavor, color and aroma. Texture highly favored panelist ie a concentration of 10% and 15% with 25 panelists (83.3%), and lowest preference level of the texture that is a concentration of 20% with 19 panelists (60.3%) The higher the concentration, the preference level panelists Getting lower. Concentration of 20% is rather tough and gritty anchovy due to additional flour to wheat flour so that the levels of gluten at reduced tempe stick. Reduced levels of gluten affects the texture of the tempeh stick it in line with the research (Pratiwi, 2013) on the use of meat meal fish float to the manufacture of stick fish declared in the process of making the dough stage of milling and cutting the dough at the time of grinding (thinning) using a grinding machine noodle with a thickness on the same machine as well as cutting the dough in all three samples stick fish experiment is the same. Stick texture so there is relatively no significant difference.

Based on the research results with the addition of flavor tempeh flour stick anchovy at all concentrations of the majority of states like the tempeh stick with a concentration of 15% with 29 panelists (96.6%) and the least preferred concentration of 0% to 7 panelists (23.3%) , Distinctive flavor savory anchovy is not lost with the addition of tempeh and create a new flavor. Tempeh recipe control stick feels a little more salty due to the addition of butter pretty much can affect flavor tempeh sticks, with the addition of anchovies flour produce a savory flavor to stick tempeh.

Nutrient content of substances Analsisis calcium is a very important mineral the body, calcium plays a role in the formation of bones and teeth in addition to the calcium is also required for the process of blood clotting, nerve transmission, muscle stimulation and maintain water balance.

The results of the analysis of the level of calcium stick tempeh produced in this study with the additions of flour anchovy 15%, ie 2316.11 ug / g in a 5 gram sample.

Based on the analysis of calcium in Desly study (2018), acceptance cheese stick with the addition of flour anchovy obtain lower calcium results at a concentration of 10% as much as 0.58 mg and the concentration of 15% as much as 0.87 mg.

Zinc is a mineral needed by the body. This mineral has a variety of benefits, such as helping the healing of wounds, instrumental in the sense of taste and smell, strengthen the immune system, helps the growth of cells. Zinc intake can usually be obtained from foods such as beef, mutton, chicken, beans, and whole grain cereals. The amount of zinc needed by the body is not much.

Adequate nutrition necessary in order to prevent the occurrence of zinc deficiency is 2-6 mg for children and 8-13 mg for adults. Zink can be obtained from mkanan and from supplements such as research fanny 2015, energy intake in group I (vitamin A), not increase significantly before and after the intervention (p = 0.278), the same thing happens in group II (p = 0237) , the intake of protein, fat, carbohydrate, vitamin a and zinc significant increase zn rate after the intervention in both groups experienced a significant increase.

The results of the analysis of the levels of zinc stick tempeh produced in this study with the additions of flour anchovy 15%, ie 0.505 ug / g in a 5 gram sample. From the

analysis, the levels of zinc in this product is classified as very low,

This is due to the addition of lime at the lower concentration will have an impact on the reduction of Zn increases. From the research results Indahsah (2015), There is a significant difference between the control Zn with the group who received the addition of lime 79 g, 238 g and 396 g. the effect of lime to the decline in average levels of Fe, Zn and lowest protein occurs at 79 g lime treatment.

Protein is part of all living cells and is the largest part of the body other than that contained in the water. The results of the analysis of protein in tempeh sticks generated in this study with the additions of flour anchovy 15%, ie 24.9% in the 0.3 g of sample. The more the addition of anchovy powder, the higher the protein content of a product. This study is in line with research conducted by rahmi 2018, the higher the addition of anchovy rice flour, the greater the protein content in corn flakes caused by abortion is higher than in TJ is 48.8 g and 9.2 g per 100 g. This study is in line with the addition of research anchovy on a tortilla flour and processed cassava products. The addition of the protein content of the product increases significantly. However, different studies conducted by (Assa, 2018). The content of the nutritional value of protein in cheese stick with the addition of wet fish meal (Stolephorus sp.) At a concentration of 15%, namely 14.64 g

CONCLUSION

Panelists received power from the aspect of color, flavor, texture highs against Tempe stick with the addition of flour anchovy at a concentration of 15%, the highest aroma aspect at 20% concentration. Based on One-Way ANOVA test no significant difference from the addition of anchovies flour to stick tempe acceptance of aspects of flavor, color and aroma. The content of protein in tempeh sticks with the addition of anchovies flour as much as 25.9 g. The content of the stick zn soybean flour with the addition of anchovies as much as 0.505 ug / g. Calcium content of the stick soybean flour with the addition of anchovies as much as 2316.11 g / g

SUGGESTION

We recommend further research done on the received power at a concentration level of 20% and eliminate the gritty texture on tempeh sticks with the addition of wet fish flour

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