Effect of Additional Shrimp Shell Flour on Characteristics and Acceptance of Cookies

Eliza*, Tiara Andreliska, Muhammad Aji, Heni Sari Wahyuni

Politeknik Kesehatan Palembang, Jl. Sukabangun 1 No.1159, Kota Palembang 30114

* Corresponding Author. E-mail: eliza_limar@yahoo.co.id

ABSTRACTS

The objective of the research was to study analyze the effect of adding shrimp shell flour to the manufacture of cookies on consumer acceptance. Research using this experimental method was conducted at the Food Technology Science Laboratory, Nutrition Department, Poltekkes Palembang and the Lampung State Polytechnic Laboratory from August to November 2021. The consumer acceptance test was carried out on 30 moderately trained panelists to assess cookies which included aspects of color, taste, aroma and texture. The results of consumer acceptance with the Friedman showed that there were no significant differences in aspects of aroma and texture, but there were significant differences in aspects of color and taste. After the acceptance test was carried out, the next step was to do a proximate analysis test on the most preferred formula, namely formula 2, and protein content (13.6%), fats content (18.6%), carbohydrates content (43.2%), water content (3.7%), and ash content (11.7%). The results of the proximate analysis test were compared with SNI 01-2973-1992, from the results of the analysis the product met the quality standard requirements, but the ash content exceeded the SNI standard.

1. Introduction

Cookies are one of the popular bakery products in all circles, made from wheat flour but do not require development (unleavened product) through the printing and baking process and the crispness of the texture is preferred with the water content that must be less than 5% (Utami, 1991). Cookies are generally made from wheat flour. Indonesia is currently ranked as the second largest wheat importer in the world. If this situation is allowed to continue, dependence on food from abroad can increase the country's foreign exchange expenditure. Therefore it is necessary to reduce dependence on the use of wheat flour. One way to reduce the need for wheat flour in the manufacture of cookies is to replace some or all of the flour in the manufacture of cookies with other flours such as shrimp shell flour.

Shrimp is an animal protein that has many benefits because of its good nutritional content for the body. However, not all parts of the shrimp are favored by the community, people in general only eat the body parts or the flesh of the shrimp. According to research conducted by Wowor, et al (2015), shrimp shells contain the main constituents consisting of 25-40% protein, 45-50% calcium carbonate, and 15-30% chitin, but the amount of this content depends on the type of shrimp. Utilization of shrimp shell flour in various processed food products will not only reduce the wasted shrimp waste but can also help increase the nutritional content of the processed food. In shrimp shell flour, the protein content is higher, namely 12.07% compared to the protein content of wheat flour, which is 8-9% (Azizah, 2009).

This study aims to determine the effect of adding shrimp shell flour to the characteristics and acceptability of cookies.

2. Materials and Methods

This study is an experimental study using a non-factorial Completely Randomized Design (CRD) with 4 treatments and 3 replications. P0 (100% : 0%), P1 (50% : 50%), P2 (40% : 60%), P3 (30% : 70%). This research was conducted in August-November 2021 at the Laboratory of Food Technology Science, Department of Nutrition, Poltekkes Palembang and the State Polytechnic Laboratory of Lampung. Data collection was obtained from the acceptance form with 4 aspects of assessment, namely color, aroma, texture, and taste. This study was an experimental study using a non-factorial Completely Randomized Design (CRD) with 4 treatments and 3 replications. P0 (100% : 0%), P1 (50% : 50%), P2 (40% : 60%), P3 (30% : 70%).

This research was conducted in August-November 2021 at the Laboratory of Food Technology Science, Department of Nutrition, Poltekkes Palembang and the State Polytechnic Laboratory of Lampung. Data collection was obtained from the acceptance form with 4 aspects of assessment, namely color, aroma, texture, and taste. Acceptance test by moderately trained panelists of 30 students majoring in nutrition. While the data collection of nutritional value content obtained from the analysis of the proximate test. Data analysis using Friedman. Chemical analysis carried out included checking the levels of protein, fat, carbohydrates, ash content, water content and compared with the SNI quality cookies (SNI-01-2973-2011).

2.1. Materials and Tools

The ingredients used in the process of making cookies include shrimp shell flour, flour, sugar flour, skim milk, margarine, butter, salt, baking powder, broiler eggs, and water. The tools used are digital scales, analog scales, rubber gloves, knives, pans, pressure cookers, blenders, 80 mesh sieves, digital thermometers, containers, mixers, cake molds, spatulas, brushes, dough rollers, cutting boards, electric ovens, measuring cup, ruler, jar.

2.2 Cookies Making Process

The process of making this cookies begins with the manufacture of shrimp shell flour. The production of shrimp shell flour is carried out through a process of sorting shrimp waste, then cleaning it from the remaining dirt and shrimp flesh left on the skin. After sorting, the shrimp shells are washed in running water until the impurities are gone. Then, the shrimp shells are washed with running water many times. The drying process was carried out using an oven at 400C for 180 minutes. After drying, the grinding process is carried out. The shrimp shell flour used in this study was mashed using a blender and filtered using an 80 mesh sieve.

Next, the making of prawn shell flour cookies is done by weighing the ingredients, mixing all the ingredients to form a dough then forming a round and then baking it for ± 30 minutes. Each dough has the same weight, which is 15 grams per portion.

Table 1. Shrimp Shell Cookies Formulation.

Ingredients	F0	F1	F2	F3
Shrimp Shell Flour (gram)	-	50	60	70
Flour (gram)	100	50	40	30
Sugar (gram)	60	60	60	60
Skim milk (ml)	50	50	50	50
Margarine (gram)	40	40	40	40
Butter (gram)	20	20	20	20
Salt (gram)	3	3	3	3
Baking powder (gram)	5	5	5	5
Eggs (gram)	40	40	40	40
Water (ml)	20	20	20	20

2.3. Organoleptic Test

The organoleptic test was a hedonic test by a panel of 30 people. Panelists were asked to rate their preference for color, aroma, taste, and texture. The test criteria are 5 (like very much), 4 (like), 3 (like somewhat), 2 (dislike), and 1 (dislike very much). This organoleptic test was carried out at the Poltekkes campus of the Ministry of Health of Palembang, the Department of Nutrition, where the panelists consisted of

a group of students who had received the subject matter of Food Technology Science (ITP). In this case, students are classified as moderately trained panelists because these panelists were not selected according to the procedure for selecting a trained panel, but they were also not taken by ordinary people who are not familiar with sensory properties in organoleptic assessors.

2.4 Analyzed of Nutrient's

Organoleptic test results data were analyzed descriptively based on the percentage of panelists' preference and the mode score of each treatment level. The percentage of panelists' preferences was calculated by adding up the percentages of panelists' preferences who stated that they strongly disliked (1), disliked (2), somewhat liked (3), liked (4), and liked (5) on the resulting cookies.

2.5. Analysis Data

The results of the organoleptic test of cookies substitution of shrimp shell flour and wheat flour were processed using the tabulation system calculation. Processing of data analysis using Microsoft Excel application. Data processing results obtained from organoleptic tests obtained the best formula, then examined the nutritional content in the form of protein, fat, ash content, water content, and total carbohydrates. aroma and texture were analyzed using the Friedman Test statistical test.

3. Result and Discussion

Graph 1 shows that the type of formula most favored by the panelists from all aspects of the assessment is F2 with the use of 60g shrimp shell flour, 40g wheat flour, 60g sugar, 50ml skim milk, 40g margarine, 20g butter, 3g salt, 5g baking powder, 40g eggs, 20ml water. These result indicate that the more shrimp shell flour is added, th more the cookies receptivity will increase, which can be seen from the panelists' assesment of color, taste, aroma, and texture.
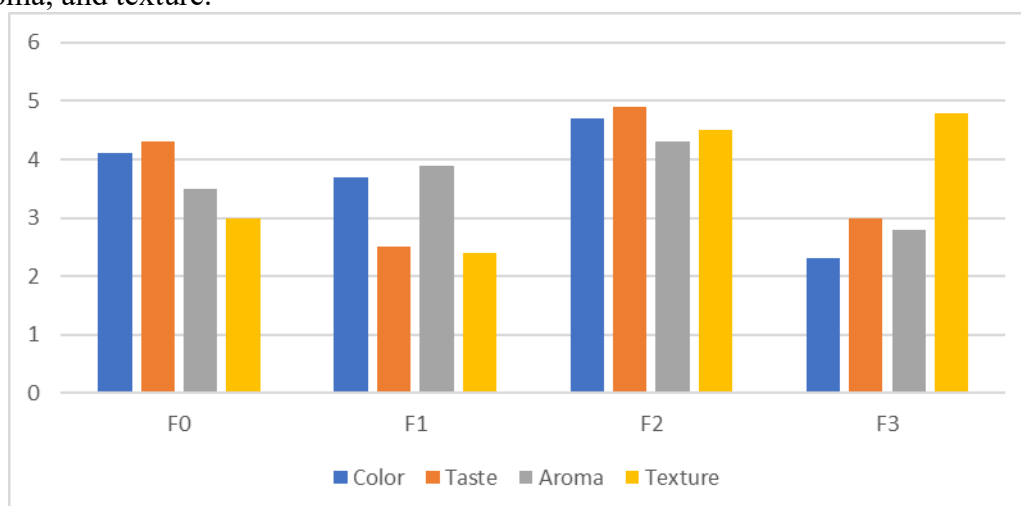

Figure 1. Average Value - Aveage Cookies Shrimp Shell Flour

Proximate analysis or chemical tsting was carried out to determine th composition of macronutrients from shrimp shell flour cookies products. The best acceptability results were in the F2 Formulation with a ratio of 60% shrimp shell flour and 40% wheat flour. The chemical analysis carried out included chcking the content of macronutrients (cabohydrates, fat content, protein content, water content, ash content). the results of research on the nutritional content of cookies can be seen in table 2.

Table 2. Proximate Analysis of Shrimp Shell Flour Cookies

Parameter	Total (%)
Carbohydrates content	43,2%
Protein content	13,6%
Fat content	18,6%
Water content	3,7%
Ash content	11,7%

a. Water Content

    Based on SNI 01-2973-1992 the maximum water content of *cookies* is 5%, while the water content analysis obtained in this study is 3.7%. Based on the results of the analysis, it was found that *cookies* had a low water content. Water is an important component that can affect the appearance, texture, and taste of food. Things that can affect the water content of foodstuffs are the type of ingredients and components, as well as the method and conditions of roasting such as tools, temperature, material thickness, and roasting time.

b. Ash Content

    Ash content is a mixture of inorganic or mineral components contained in a food ingredient. The ash content of a food ingredient describes the amount of minerals burned into non-volatile substances. Analysis of the ash content obtained on *cookies* is 11.7%, this exceeds the standard of ash content of *cookies* based on SNI 01-2973-1992. Stevani's research (2015) also stated that the ash content value increased along with the high addition of shrimp shell flour in the manufacture of cookies.

c. Protein Content

    The quality standard of *cookies* according to SNI 01-2973-1992 has a good protein content of at least 9%, while the results of the analysis of *cookies* contain a protein content of 13.6%. Protein is one of the macronutrients that plays a very important role in the formation of tissue cells in the body and also produces energy (Cakrawati, 2012). This protein content analysis is intended to determine the protein content contained in *cookies* prawn shell flour on the F2 formula.

d. Fat Content

    In the analysis of the fat content of *cookies* , the results obtained 18.6%, this does not exceed the quality standard *cookies* according to SNI 01-2973-1992, the quality standard requirement for fat is at least 9.5%. Fat is a source of energy for the

body in addition to carbohydrates, the source of energy produced by fat is greater than carbohydrates and protein, which is 9 Kcal/gram (Kurtzwell, 2006).

e. Carbohydrates Content

The carbohydrate content *cookies* is 43.2%. This is in accordance with the quality standard *cookies* according to SNI 01-2973-1992, the quality standard requirement for carbohydrates is a maximum of 70%. Carbohydrates are the main source of calories and several groups of carbohydrates produce fiber that is useful for digestion, and plays an important role in determining the characteristics of food ingredients such as taste, color, texture, and others.

4. Conclusion

1. The addition of shrimp shell flour in the manufacture of cookies with different proportions in each treatment can significantly affect the acceptability of cookies to taste, color, aroma, and texture.

2. The Friedman test value with the highest average rank from the organoleptic test assessment with a hedonic scale indicates that the taste, aroma, texture, and color preferred by the panelists are in the treatment with the addition of 40 grams of wheat flour and 60 grams of shrimp shell flour (F2).

3. The results of the proximate analysis of the best cookie formulas are 13.6% protein content, 18.6% fat content, 43.2% carbohydrate content, 3.7% water content and 11.7% ash content. From the results of the analysis, the ash content exceeds the standard of SNI 01-2973-1992.

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