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Physical and Hedonic Test of Ginger (Zingiber officinale) Cookies

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ABSTRACT

Ginger (Zingiber officinale) is one type of medicinal plants in Indonesia that are often used as herbal medicine. The active substances contained in ginger are gingerol, shogaol, triterpenoids, flavonoids and saponins. Cookies are practical food because they can be eaten at any time and have a relatively long shelf life. Cookies can be seen as a good medium as one type of food that can meet the special needs of humans. Various types of cookies have been developed to produce cookies that are not only tasty but also healthy. Therefore researchers are interested in making ginger into cookies that are healthy and beneficial to the body. The purpose of this study was to find out the results of physical tests and tests hedonic cookies ginger (Zingiber officinale). The type of research conducted was observational with descriptive research design. The results of the study for organoleptic test obtained cookies brownish color, smell typical ginger, sweet taste and typical ginger, crispy texture. Physical test results were produced ie for pH test obtained on average 7, water content test results get an average 4.26%, ash content test gets an average results of 11.25%. Hedonic cookies test results for flat texture 2.28, color 2.6, taste 2.44 and aroma 2.52. Based on physical tests that have been done on ginger cookies the results obtained do not meet the requirements as determined.

Keywords : *Physical test, hedonic test, cookies, ginger*

INTRODUCTION

Cookies are a fairly popular food. Cookies are practical food because they can be eaten anytime and with good packaging, cookies have a relatively long shelf life. Cookies can be seen as a good medium as a type of food that can meet special human needs. Various types of cookies have been developed to produce cookies that are not only delicious but also healthy (Manley, 2000). Cookies are often consumed as a snack between two meals. Cookies are made from flour-based ingredients and other additives that form a formula, so as to produce cookies with certain structural properties.

There are various kinds of processed ginger cookies in Indonesia, such as ginger cakes, ginger cookies, ginger janagels, eggless wood ginger cookies, choco ginger oats cookies, peanut ginger chocolate cat tongue and many more.

Ginger *(Zingiber officinale*) is one type of medicinal plant in Indonesia which is often used as herbal medicine. The active substances contained in ginger include gingerols, shogaols, triterpenoids, flavonoids and saponins (Etika, et al., 2017). Ginger is a very important plant for the people of Indonesia and the world, because of its uniqueness that cannot be replaced by other plants. The spicy taste and aroma can warm the body and sweat.

In the culinary world, ginger plays an important role, either as a component of food and beverages or as a component of kitchen spices. Processed ginger is very popular because it has a fresh aroma, sharp, and spicy taste. Ginger can be processed into various food products. Ginger can be used as an ingredient in vegetables, salads, pickles, pickles or crystal ginger. One of the efforts to increase the usability of ginger and its economic value can be done by diversifying the types of processed ginger products. The disadvantage of ginger is that it is not durable because it contains a lot of water so it rots easily. Besides being used for cooking, ginger is also useful for health (Gardjito, 2013).

Based on the above background the author is interested in conducting research on cookies with the addition of ginger. Cookies are a popular snack/snack and there are various types of cookie products available in the community. Cookies made from additional ginger have not been found, so cookies will be made with ginger added and physical tests will be conducted.

METHOD

This type of research was observational research or observation, namely a planned procedure, including observing, viewing, recording, a number of results and the level of activity that has to do with the problem under study (Notoadmodjo, 2012). The research design used was a descriptive design. Descriptive research method that aims to get a description or descriptive about a situation objectively (Notoadmodjo, 2012).

This research makes cookie preparations from ginger powder. This study only describes how to make cookies, tested physical tests (organoleptic test, pH test, water content test, ash content test) and hedonic test.

The population in this study was 290 grams of ginger cookies. Sampling of the physical test of this study used a simple random sampling technique. Simple random sampling is the taking of sample members from the population which is carried out randomly without regard to the strata of the group (Sugiono, 2019). The sample in this study was 40 grams of ginger cookies for physical tests and 250 grams for hedonic tests.

Research Materials and Tools

Tools and materials used in the preparation of ginger cookies:

a. Ingredients: ginger powder, flour, butter, brown sugar, eggs, vanilla essence, baking powder, granulated sugar.
b. Tools: knife, baking sheet, oven, stirrer, basin, plastic wrap, refrigerator, scale, spoon.

Tools and materials used in the physical test of ginger cookies

Ingredients: ginger cookies, aquadest,

Tool: pH indicator, porcelain crucible, oven, desiccator, tongs, furnace, porcelain exchange, desiccator, analytical balance, oven, questionnaire, stationery

Implementation of the Research

a. Preparation of materials

   Fresh ginger rhizomes were purchased at the Gabus Market, Jatinom District, Klaten Regency. The ginger rhizome is then cleaned of adhering dirt.

b. Making ginger powder (jahe emprit)

   Ginger rhizome that has been washed and cleaned. Then the ginger rhizome is thinly sliced so that it is easy to dry when dried in the sun. After drying, the ginger rhizome is mashed with a blender until it becomes smooth. Then sieved using a mesh.

c. Preparation of ginger cookies

   Ginger cookies are made with the following modified formula in Table 1

Table 1. Cookies Ingredients

Material	Quantity
Egg	1 egg
Butter	200 gram
Brown sugar	130 gram
Baking powder	1/2 tea spoon
Flour	280 gram
Sugar	150 gram
Ginger powder	30 gram
Vanilla Essence	1 tea spoon

Source : Modified from Indah Juni, 2020. Uji Fisik dan Uji Hedonik Biskuit Kelor

The first step was to prepare the materials to be used. After that, mix the flour, salt, baking soda, ginger powder and mix well. In another bowl, mix the cooled melted butter then add the brown sugar and granulated sugar and mix until smooth. Add one egg and vanilla and mix again until well combined. Then add half the dry ingredients to the wet ingredients. Once mixed, add the remaining dry ingredients and mix again. Then wrap the dough with plastic wrap and transfer to another container. Cover and place in the refrigerator for 30 minutes. Prepare the pan to be used. Then take the dough about 10 grams and round it. Place in the pan until the pan is full. Give space between dough. Once the pan is full, flatten the dough until it is flat. Not too thin and not too thick. To keep its shape, put it in the freezer for 15 minutes. Then bake in the preheated oven at 170^{o}C for 18 minutes. Once cooked, then ready to be served.

Organoleptic Test

a. Organoleptic tests are carried out to describe the shape, color, smell, and texture of the preparation by using the senses of sight, smell, taste and touch. Done by seeing or observing the color, smell, dosage form of cookies.
b. pH test
   The pH test was carried out by diluting 10 grams of crushed ginger cookies and then adding aquades, then attaching the pH indicator to the cookie preparation to be tested and then seeing the value obtained on the pH indicator.
c. Test water content
   The water content test was carried out by weighing 10 grams of ginger cookies, then placing them in a cup with a known weight, then placing it in an oven at a temperature of 100-105℃ for 3-5 hours, then cooling it in a desiccator. After that, weigh the dried ginger cookies.

   Calculation of water content = $\frac{b-c}{b-a} x100\%$

   Information:
   a: dry weight of the cup (grams)
   b: dry weight of the cup and initial sample (grams)
   c: dry weight of the cup and sample after drying (grams)
d. Ash content test
   The ash content test was carried out by weighing 10 grams of ginger cookies and then placing them in a porcelain exchange rate of known weight, burning the exchange rate on a furnace at a temperature of 500oC for 4-6 hours or until white ash was formed, then placing the sample in a desiccator. After that weigh the sample.

   Calculation of ash content = $\frac{w2-w0}{w1-w0} x100\%$

   Information:
   a. W0: weight of empty cup
   b. W1: cup weight + sample before ashing
   c. W2: weight of cup + sample after ashing

e. Hedonic test

The hedonic test used an assessment questionnaire as the median based on the panelists' subjective responses to the attitude of liking or disliking ginger cookies. The hedonic test was carried out with 25 untrained panelists. This test is carried out by the panelists by tasting the sample, then giving an assessment. The value scale used is a numerical value scale with a value of 1-3. A value of 1 indicates that you don't like it, a value of 2 says you like it and a value of 3 says you really like it (Firdaus et al., 2013).

Result Analysis

Data analysis in this study used urivariate analysis, namely there was only 1 measurement (variable) for the sample or it could be the measurement of several variables (Santoso, 2015). The data is presented in the form of tables and narratives. The data will be generated by the average physical test while the hedonic test will be collected using a questionnaire. This research was carried out only until the ash content test stage, because there were obstacles in the tools and materials.

RESULTS AND DISCUSSION

Physical tests carried out in this study include organoleptic tests, pH tests, water content tests, and ash content tests carried out at the Herbal Analysis Laboratory, Department of Herbal Medicine, Health Polytechnic of the Ministry of Health, Surakarta. Hedonic testing was carried out by giving ginger cookies along with a questionnaire to the panelists for hedonic testing which included texture, color, taste and smell. The data obtained were univariately presented in the form of tables and percentages.

Ginger cookie dough as much as 795 grams which includes wet dough consisting of 1 chicken egg, 200 grams of butter which is stirred evenly and for dry dough consisting of 130 grams of brown sugar, 280 grams of wheat flour, 150 grams of sugar, 30 grams of ginger powder, 1 /2 tsp baking powder and 1 tsp vanilla essence stir until evenly distributed. Wet and dry dough is then mixed until smooth and then molded according to taste and then baked. The results obtained as many as 48 ginger cookies.

Ginger Cookies Physical Test Results

Organoleptic Test

The organoleptic test included subjective observations of the texture, color, taste and smell of ginger cookies by researchers using a tool in the form of the five senses. The following are the results of the organoleptic test of ginger cookies

Table 2. Ginger Cookies Organoleptic Test Results

Texture	Color	Taste	Smell
Crispy	Brown	Sweet and distinctive ginger	Ginger

Organoleptic tests were carried out by observing color using the sense of sight, smell using the sense of smell, taste using the sense of taste and texture using the sense of touch.

The organoleptic test results of ginger cookies have a crunchy texture, brownish color, a distinctive ginger odor, a sweet and distinctive ginger taste. Ginger cookies are brownish in color with a distinctive ginger aroma and the taste is sweet and warm at the end due to the addition of ginger powder. The brownish color of the cookies makes them attractive to eat. The smell and taste of cookies gives its own effect, which is warm at the end. The sharp taste stimulates the appetite. Another study showed that the results of organoleptic cookies that were tested on cookie ingredients affected the texture, color, smell, taste.

Based on table 2. shows cookies have a sweet and distinctive taste of ginger. The sweet taste is caused by the presence of sucrose. This is supported by (Fitriyani, 2011) that sucrose is a chemical compound that has a sweet taste, white color and is soluble in water. The distinctive taste of ginger is that it feels stronger and gives a warm feeling.

pH test

The pH or acidity test of ginger cookies was carried out using a pH indicator, namely by dipping the two tools into a 10 grams dilution solution of ginger cookies with 20 ml of distilled water.

Table 3 Ginger Cookies pH Test Results

Tool	pH
pH indicator	**7**

In this study the pH value of cookies obtained was 7 which means alkaline. So it tends to be safe and good for health because the composition of the food consumed has nothing to do with changes in pH levels caused. Acidic substances have a pH below 7. While a pH above 7 is said to be alkaline or alkaline. Several studies have shown that consuming alkaline foods can improve health. Based on the results of the study, it is known that consuming alkaline foods does not affect pH levels in the blood (Saraswati, 2020).

Moisture Test

Water content is the percentage of water content in ginger cookies and the results are shown in table 4 below

Table 4 Test Results of Ginger Cookies Moisture Content

Sample weight	Cup weight	Sample weight+cup	Water content (%)
10,0003 g	67,5536 g	75,0615 g	4,26

Based on table 4, the results of the ginger cookies water content test are known to be 4.26%. Moisture content is used to determine the water content of ginger cookies preparations. The results of the water content of ginger cookies show that the resulting yield is 4.26%, this indicates that ginger cookies are close to the cookie quality requirements in SNI in 2011 which is a maximum of 5%. So the results of the water content in these ginger cookies have met these requirements, so they are considered safe for consumption and have the strongest resistance from the threat of microbial attack and rot in the near future. (Herawati, 2012) stated that the water content can determine the quality of the resistance of a simplicia where simplicia with a water content that is too high makes it susceptible to rot due to damp conditions. Another study tested the moisture content of cookies showing a higher yield of 8.66%. According to (Fatkurahman et al. 2012) there are several important processes during baking, namely dough development, protein coagulation, starch gelatinization, and water evaporation.

Ash Level Test

The ash content test is the maximum value or range allowed for ginger cookies and the results are shown in table 5

Table 5 Test Results for Ginger Cookies Ash Content

Empty exchange weight	Sample weight	Weight of cup+sample after ashing	Weight of cup+sample before ashing	Result
60,8982 g	10,0032 g	62,0244 g	70,9014 g	11,25%

Based on table 5. the results of the ginger cookies ash content test are known to be 11.25%. Ash content is used as a parameter to measure the mineral content of a sample. (Emilan, et al., 2011) stated that the measurement of ash content aims to provide an overview of internal and external mineral content originating from the initial process until the extract is formed. The ash content should not be too high, based on the standard requirements for the quality of cookies, the maximum ash content is 1.5% because in the ash content there are minerals that can cause precipitation in the kidneys so that it can interfere with health. The ash content of the tested cookies is known to have an ash content above the standard cookie quality requirements, this is probably due to the high contaminants due to the storage of the type of cookies tested which is dominated by physical impurities such as gravel, sand, etc. The test results show that the average ash content is 11.25%, so it is not good for consumption in large quantities. For this reason, cookies should be consumed as snacks to balance the nutritional value contained in them. Another study showed the results of the ash content in the treatment of cookies with the substitution of 30% avocado seed flour and 6% ginger flour which was 1.66% and the lowest ash content was found in the ratio of 10% avocado seed flour and 2% ginger flour which was 1.52% (Septiaji, et al., 2015).

Ginger Cookies Hedonic Test Results

The hedonic test is a preference test which is a statement about, impression, very like, like, dislike very much, dislike. The hedonic test includes several aspects such as texture, color, taste and smell of ginger cookies, the results are shown in table 6.

Table 6 Ginger Cookies Hedonic Test Results

No	Indicator	Total score	Average
1	Texture	57	2,28
2	Color	65	2,6
3	Smell	61	2,44
4	Flavor	63	2,52
Total average			9,84

Based on table 6 the average hedonic test results for ginger cookies show the total average for texture is 2.28, color is 2.6, aroma is 2.44 and taste is 2.52.

The hedonic test was carried out on local residents in Derepan hamlet with 25 respondents. The hedonic test results showed differences in the responses of each ginger cookie. The results of the hedonic taste test have an average value of 2.44, this indicates that respondents like ginger cookies. This taste can be known after the pastries are eaten. Taste can be distinguished as sweet, sour, salty and tasteless and is influenced by the ingredients used (Wahyuni, 2006) from the results of research cookies have a taste that is not too sweet.

On the texture preference indicator, the results showed that ginger cookies had a crunchy texture. The respondent's preference for texture has an average value of 2.28. Another study showed that the mixture of wheat flour and ginger starch used did not have a significant effect on texture (Hartati, 2012). A good cookie has a smooth, dry, crunchy, crumbly, light texture, not too fluffy and the surface is not too cracked.

Color plays an important role in determining panelists' preference for a product. The longer the roasting time, the more brown the resulting product is due to the browning reaction (Winarno, 2002). On the indicator of color preference, the results of the study show that the brown color value of respondents' preference for color has an average value of 2.6. Another study showed that the mixture of wheat flour and ginger starch used did not have a significant effect on color (Hartati, 2012).

The flavour of pastries is influenced by the components of the ingredients used, such as margarine, eggs, additives and the type of flour (Wahyuni, 2006). On the parameter of aroma preference, the results showed that ginger cookies had a distinctive ginger aroma. The respondent's preference for aroma has a value with an average of 2.52. Other studies have shown that the mixture of wheat flour and ginger starch used has a significant effect on aroma (Hartati, 2012). This can be caused because there are still essential oils that are included in the ginger starch and give a distinctive aroma to the resulting cookies.

The results of the research for the organoleptic test showed that the cookies were brownish in color, had a distinctive ginger smell, tasted sweet and characteristic of ginger, had a crunchy texture and was slightly hard. The results of the physical test were obtained, namely for the pH test, an average of 7 was obtained, the water content test results obtained an average of 4.26%, the ash content test obtained an average result of 11.25%. The results of hedonic cookies test for texture averaged 2.28, color 2.6, taste 2.44 and aroma 2.52.

Based on the physical tests that have been carried out on ginger cookies, the results obtained do not meet the specified requirements, namely the ash content test. However, the other physical tests, namely the organoleptic test and the water content test, have met the specified requirements. It can be concluded that ginger cookies from the results of this study are suitable for consumption.

Ash content is used as a parameter to measure the mineral content of a sample. Emilan, et al. (2011) stated that the measurement of ash content aims to provide an overview of internal and external mineral content originating from the initial process until the extract is formed. The ash content should not be too high, based on the standard requirements for the quality of cookies, the maximum ash content is 1.5% because in the ash content there are minerals that can cause precipitation in the kidneys so that it can interfere with health. The ash content of the tested cookies is known to have an ash content above the standard cookie quality requirements, this is probably due to the high contaminants due to the storage of the type of cookies tested which is dominated by physical impurities such as gravel, sand, etc. The test results show that the average ash content is 11.25%, so it is not good for consumption in large quantities. For this reason, cookies should be consumed as snacks to balance the nutritional value contained in them. Another study showed the results of the ash content in the treatment of cookies with the substitution of 30% avocado seed flour and 6% ginger flour which was 1.66% and the lowest ash content was found in the ratio of 10% avocado seed flour and 2% ginger flour which was 1.52%. (Septiaji, et al., 2015).

CONCLUSION

The results of the physical test include the organoleptic test results of ginger cookies (*Zingiber officinale*) having a crunchy texture, brownish color, sweet and distinctive ginger taste, ginger smell. Ginger cookies pH test results are 7, it can be said that ginger cookies have an alkaline pH. So it tends to be safe and good for health because the composition of the food consumed has nothing to do with changes in pH levels caused. The results of the ginger cookies water content test showed that the cookies water content was 4.26%. The formula is in accordance with SNI, which is less than 5%. The results of the ginger cookies ash content test showed that the ash content of cookies was 11.25%. The formula exceeds SNI with a maximum limit of 1.5%. The ginger cookies hedonic test has the highest value, namely the color test results with an average of 2.6 and the lowest value on the texture test results with an average of 2.28.

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