

CHOCOCHIP DRY CAKES AS A SNACK FOR DIABETES SUFFERERS

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ABSTRACT

Choco chips are chocolate in the form of small granules, usually chocolate chips are used as decoration on cakes, pastries and so on. Generally, chocolate chips are only used as a snack and contain high levels of sugar. This research discusses how to consume choco chip snacks which have low sugar content and are safe for diabetes sufferers. The independent variables used in this research are the types of sugar in the form of palm, regular and tropical as well as the types of wheat and oat flour. This research was carried out by making dry cakes first with various variations of sugar and flour. After that, tests are carried out in the form of water, protein, carbohydrate, free fatty acid content and organoleptic tests. From the research results, it was found that the lowest content test was a sample of wheat flour with a variation of tropical sugar of 4.1%, while the choco chip cake with the highest water content was a sample of oat flour with a variation of palm sugar with a water content of 6.36%. In the protein content test, the choco chip cake with the lowest protein content was a sample of oat flour with a variety of tropical sugar with a protein content of 101.06 mg/L, while the choco chip cake with the highest protein content was a sample of wheat flour with a variety of tropical sugar with a protein content of 204.51 mg/L. In the carbohydrate content test, the choco chip cake with the lowest carbohydrate content was a sample of wheat flour with a variety of regular sugar with a carbohydrate content of 60.17 mg/L, while the choco chip cake with the highest carbohydrate content was a sample of oat flour with a variety of regular sugar with a carbohydrate content of 109.22 mg/L. In the free fatty acid content test, the choco chip cake with the lowest free fatty acid content was a sample of wheat flour with a variety of regular sugar with a free fatty acid content of 1.01%, while the choco chip cake with the highest free fatty acid content was a sample of oat flour with a variety of sugar. sugar palm with a free fatty acid content of 1.69%. In the organoleptic test for panelists, the choco chip cake with the highest average score was in the sample with variations of oat flour and palm sugar.

Key words : antidiabetes, chocolate chips, cookies

1. INTRODUCTION

Biscuits are small cakes, made from a mixture of thick and liquid, with long-lasting characteristics. In general, the quality of cookies is determined by their size, taste and texture. There are 3 (three) methods for making cookies, namely the one-step method, the whipping method, and the sponge method. Meanwhile, cookie variants are classified based on dough manipulation techniques. The technique for making and handling dough is divided into 6 (six) parts, namely: Drop, Bar, Rolled or Cutout, Molded, Pressed and Wafer (1). Choco Chips cake is made from wheat flour, eggs and butter (butter)/margarine, the cake has a crunchy texture and tastes delicious with the aroma of butter. But when eating snack sizes, these small amounts must be taken into account. According to nutritionist Dr. Tirta Prawira Sari eats 3 biscuits with the same calories as a plate of rice. He also said warm butter contains a lot of fats such as trans fats which can affect cholesterol levels. Apart from affecting cholesterol levels in the body, cakes have little fiber.

Research Urgency

According to data from various global studies, Indonesia ranks 7th in the world with diabetes sufferers experiencing serious health problems. In 2015, around 15 million people suffered from diabetes, and it is estimated that this will increase to 642 million in 2040. Because the number of diabetes sufferers will increase every year (IDF, 2015). One of the causes of the high prevalence of diabetes is consumer behavior. Lifestyle changes also affect consumption patterns, causing people to pay less attention to the food they consume. Consuming foods with a high glycemic index can cause insulin resistance. Diabetes mellitus sufferers experience a decrease in blood sugar levels after consuming foods with a low glycemic index (2). Foods that have a low glycemic index reduce the rate of glucose absorption and suppress the secretion of the pancreatic hormone insulin,

so that there is no spike in blood sugar levels. The glycemic index of a food ingredient depends on the fiber content, amylose to amylopectin ratio, fat and protein content, and starch digestibility (3). Therefore, low glycemic index foods are needed as an alternative to prevent diabetes. Cookies are a type of small, chewy, sweet food that is much sought after by the public and is consumed as an accompaniment to drinking tea. In general, the main raw material for baked goods is wheat flour, which is one of the products imported from abroad. To reduce dependence on wheat flour, raw materials for baked goods must be replaced with low carbohydrate sources such as wheat flour which is a local Indonesian ingredient.

2. RESEARCH OBJECTIVES, BENEFITS AND LIMITATIONS

The development of chocolate chip cookie products with wheat flour is also an effort to diversify food using local ingredients. The addition of wheat flour in making dry cakes can increase the nutrition of the cake. Meanwhile, to find chocolate chip cookies that are safe to consume for diabetics, you need to pay attention to their nutritional content, especially the sugar or carbohydrate content and fat content. However, the effect of using wheat flour on the chemical composition of chocolate chip cookies is not yet known. Therefore, this study aims to determine the appropriate chemical composition of dry cakes as snacks for diabetics. The limits of the research include variations in the type of sugar and type of wheat flour on variations in the taste of chocolate, pandan, and Oreos are known as snacks for diabetes sufferers, so the best composition of chocolate chip cookies is based on variations in the type of sugar and type of wheat flour and variations in the flavors of chocolate, pandan and oreos as snacks for diabetes sufferers.

3. RESEARCH METHODS

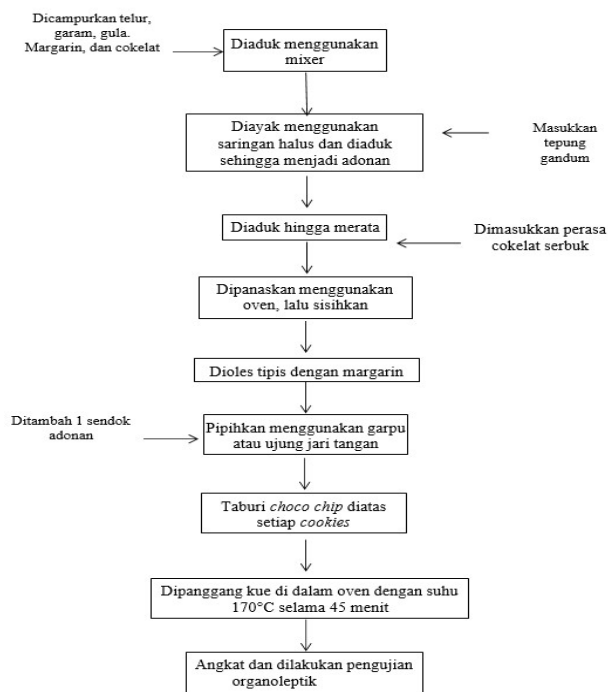
Research methodology

The materials used in this research are wheat flour, palm sugar, butter, egg yolk, cocoa powder, pandan powder, oreo powder, chocolate milk powder, vanilla, chocolate chocochips

- The test steps are as follows:
 1. Mix eggs, salt, sugar, margarine, chocolate, then beat using a mixer.
 2. Add the chili wheat flour, sifted using a fine sieve, stir with a spatula until evenly mixed so that it becomes a dough
 3. Add chocolate powder or pandan powder to the mixture
 4. Preheat the oven, set aside
 5. Prepare a thin spread with margarine
 6. Take 1 teaspoon of the mixture and put it on the baking sheet, then flatten it using a fork or your fingertips. Do this until all the dough is used up
 7. Sprinkle chocolate chips on top of each cookie
 8. Bake the cake in the oven at 170°C for 45 minutes until cooked.
 9. Remove and test to ensure it is safe for consumption

• Experimental Treatment

- 1) Fixed variable
 - Synthesis time: 45 minutes
 - Synthesis temperature: 170°C
- 2) Independent variable
 - Flavor Variations: sugar palm; normal; and tropical
 - Types of flour: oat and wheat
- 3) Dependent variable
 - Water content
 - Protein content
 - Carbohydrate levels
 - Organoleptic test



4. RESULTS AND DISCUSSION

1. Water content

Moisture analyzer is a tool used to measure the water content in a material. In this research, the water content test was used to determine the water content of each sample, namely samples of oat flour with variations of palm sugar, regular sugar and tropical sugar and wheat flour with variations of palm sugar, regular sugar and tropical sugar. By using a moisture analyzer, users can get accurate and reliable measurement results to ensure the quality of the products produced. The following is Figure 4.1 regarding the water content of each sample.

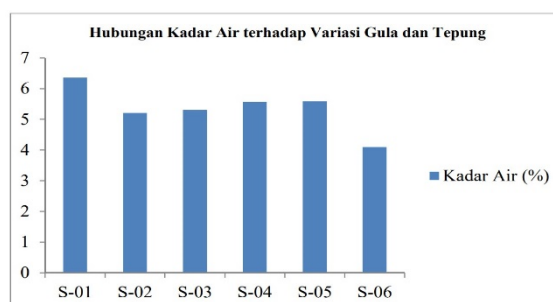


Figure 4.1 Graph of water content in samples tested using a moisture analyzer.

The chocochip cake with the lowest water content is a sample of wheat flour with a variation of tropical sugar with a

water content of 4.1%, while the chocochip cake with the highest water content is a sample of oat flour with a variation of palm sugar with a water content of 6.36%. A good cookie moisture content standard is one that reaches a minimum of 3.57% and a maximum of 5%, which meets the USDA cookie quality requirements, (2018). In treatments F0 (5.70%), F1 (4.91%), F2 (4.70%) and F3 (3.97%). The four treatments met the characteristics of cookies according to USDA (2018), namely $\geq 3.57\%$ (Izza et al, 2019). From the research results obtained, chocochip cakes with variations of wheat flour with added tropical sugar are feasible and meet standards.

2. Protein Content

The Kjeldahl method is the most commonly used method for analyzing protein levels. This method involves digestion of the sample with concentrated sulfuric acid and then distillation of the resulting ammonia. After that, the ammonia formed is reacted with a sulfuric acid solution to produce ammonium sulfate compounds. The nitrogen content in this compound is then calculated and converted to protein content using the appropriate conversion factor. Although the Kjeldahl method takes quite a long time and requires the use of dangerous chemicals, it is considered an accurate and reliable method for analyzing protein levels.

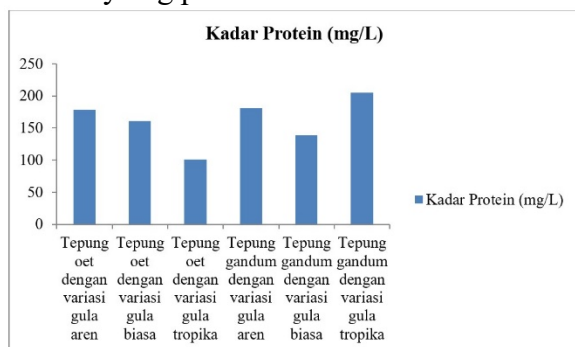


Figure 4.2 Protein levels in the sample

Based on Figure 4.2 above, we can see that the chocochip cake with the lowest protein content is a sample of oat flour with a variety of tropical sugar with a protein content of 101.06 mg/L, while the

chocochip cake with the highest protein content is a sample of wheat flour with a variety of tropical sugar with protein content was 204.51 mg/L. From the research results obtained, cakes with variations of wheat flour have higher protein than oat flour. Wheat has antidiabetic properties because of its high fiber content. The fiber content can actually reduce glucose levels, thereby helping to control blood sugar levels (4). Therefore, wheat flour is suitable for consumption by diabetics.

3. Carbohydrate Levels

In testing carbohydrates on a sample, iodine solution is used as an indicator. When the iodine solution is mixed with samples containing carbohydrates, the color changes to blue or purple, which is caused by the reaction between iodine and the hydroxyl groups on the carbohydrate. The blue or purple color that forms becomes more intense if the carbohydrate content in the sample increases. Therefore, using iodine solution as an indicator can help identify the presence of carbohydrates in a sample. The following is Figure 4.3 regarding the carbohydrate content of each sample which can be seen in the following graph.

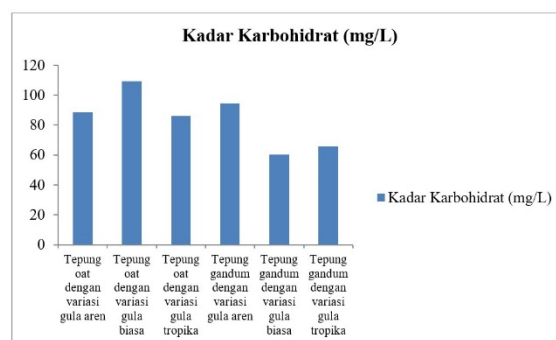


Figure 4.3 Graph of carbohydrate levels in samples.

The chocochip cake with the lowest carbohydrate content is a sample of wheat flour with a variation of regular sugar with a carbohydrate content of 60.17 mg/L, while the chocochip with the highest carbohydrate content is a sample of oat flour with a variation of regular sugar with a carbohydrate content of 109.22 mg/L.

From the research results obtained, cakes with variations of oat flour have higher carbohydrate levels than wheat flour. According to Kusbandari (2015), carbohydrates are aldehyde or ketone compounds with hydroxyl groups which are the main components of organic materials and sources of energy, fuel and metabolic intermediates. In this study, treatment of oat flour with a variation of regular sugar had the highest carbohydrate content of 109.22 mg/L. The research results show that heating at high temperatures can cause carbohydrate levels to decrease because it can damage starch granules. Carbohydrate damage can occur because the polymer will hydrolyze and break down (6).

4. Biodegradation

The results of organoleptic tests can be used to improve product quality and meet consumer expectations for delicious and high quality chocochip cookies. Figure 4.4 below is the result of the organoleptic test of choco chip cake taken from panelists who were students from the Lhokseumawe State Polytechnic. The method used to evaluate the quality of a product based on its sensory characteristics is organoleptic testing. One product that is often tested organoleptically is chocochip cake which is known for its distinctive sweet and crunchy taste. In the chocochip cake organoleptic test, the assessor will taste the cake and assess its sensory characteristics. Based on the picture below, we can conclude that the chocolate chip cake sample with the highest average score on the organoleptic test is in the sample with variations of oat flour and palm sugar, namely 4. Meanwhile, the choco chip cake with the lowest organoleptic test percentage is found in the sample with variations of wheat flour and palm sugar is 3.11. Chocochip cakes with variations of oat flour and palm sugar are very popular with the panelists, this is because in terms of color, aroma and texture, the oat flour is very good. The chocolate color of chocochip cookies,

complemented by dark brown stains from chocolate chips, has an appetizing impact on the connoisseurs. The color chocolate often connotes deliciousness and enjoyment, which attracts connoisseurs to try this cake. Besides that,

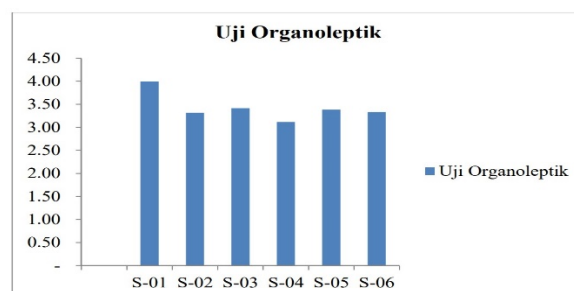


Figure 4.4 Graph of organoleptic chocolate chip analysis results.

Not only that, aroma also plays an important role in the appeal of chocochip cookies. The aroma of chocolate chip cookies, especially the aroma of chocolate and the smell of the dough being baked, is a major factor in attracting attention. The delicious aroma of chocolate can whet the appetite of connoisseurs and invite them to taste the cake. The warm and sweet aroma that wafts while the cake is being baked can also remind connoisseurs of happy memories or moments of sharing food, which adds to the pleasure of enjoying the cake. Lastly, in terms of shape and texture, chocochip cookies also play a role in their popularity among connoisseurs. The combination of the crispy outer layer and soft inside of the cake provides an interesting multisensory experience

CONCLUSION

The best sample of chocolate chip cookies for diabetics is with a variety of wheat flour and tropical sugar. Water levels, carbohydrates, protein, free fatty acids, and organoleptic test scores on chocolate chip cake samples with variations of wheat flour were 4.1% each; 65.73 mg/L; 204.51 mg/L; 1.07 %, and 3.33. From the research results above, the water, carbohydrate and free fatty acid levels obtained were the lowest and the protein levels obtained were the highest. Therefore, chocolate chip cookies

with a variety of wheat flour and tropical sugar are very good for consumption by diabetics. However, for organoleptic test scores, this cake does not have the highest score.

REFERENCES

1. Sukriadi, E.H. dan Listiarini, V.D. 2021. Kreasi Choco Chips Cookies Buah Alpukat. *Jurnal Kajian Pariwisata*. 3(2): 53-39.
2. Mayawati, H. dan Farida, N. 2017. Hubungan Asupan Makanan Indeks Glikemik Tinggi dan Aktivitas Fisik dengan Kadar Glukosa Darah pada Pasien Diabetes Mellitus Tipe II Rawat Jalan Di RSUD Karanganyar. *Jurnal Kesehatan*.10(1): 75-83.
3. Istiqomah, A dan Ristanti, N. 2015. Indeks Glikemik, Bebab Glikemik, Kadar Protein, Serat, dan Tingkat Kesukaan Kue Kering Tepung Garut dengan Substitusi Tepung Kacang Merah. *Journal of Nutrition College*. 4(2): 620- 627.
4. Yudianti. Dan Firdaus, S. 2022. Analisis Kadar Pati Resisten, Total Serat dan Daya Terima Kabosol Tersubstitusi Tepung Pisang Kepok Termodifikasi. *Jurnal Gizi Poltekkes Kemenkes Mamuju*.
5. Kusbandari, A. 2015. Analisis kualitatif kandungan sarida dalam tepung dan pati umbi ganyong (Canna edulis Ker.) *Journal Pharmacia* 5:1 (35-42).
6. Kurniawan, Ferry., 2015. Pengaruh Pemanasan Terhadap Kadar Gula Reduksi Pada Tepung Biji Nangka. *Kimia Pangan* 1(1): 5-10.
7. Rodiah, S. 2019. Diversifikasi Produk Choco Chips Cookies Tepung Mocaf Substitusi Tepung Pisang Raja Nangka Untuk Memanfaatkan Pangan Lokal. *Jurnal PKK Boga*. 1(1): 1-15.
8. Ariyantoro, A.R., Anam, C., Kawiji., Minardi, S., Zulfa, F., Purnomo, D., Muzayana, E., Atmaja, R.P. dan Widiatmoko, C. 2019. IBM Pengembangan Produk Cokelat Couverture dengan Penambahan Pangan Fungsional di Desa Randualas Kecamatan Kare Kabupaten Madiun. *Journal of Community Empowering and Services*. 3(2): 43-48
9. Andragogi, V., Bintoro, V.P. dan Susanti, S. 2016. Pengaruh Berbagai Jenis Gula Terhadap Sifat Sensori dan Nilai Gizi Roti Manis. *Jurnal Teknologi Pangan*. 2(2): 13-17.