PRELIMINARY STUDY ON THE ORGANOLEPTIC QUALITY OF CORN-COWPEA COOKIES MADE FROM COMPOSITE CORN AND COWPEA FLOUR AS AN ANTIDIABETIC ALTERNATIVE FOODS

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Abstract

Corn and cowpea from Kisar Island have been reported to have nutritional content. With its nutritional content, it will be very useful if it is combined into a cookies product that can be developed especially for diabetics. In order to be used in the manufacture of cookies, it is necessary to know the correct formulation between corn flour and cowpea flour, especially in local varieties from South West Maluku District, and also to know the organoleptic value of corn-cowpea cookies products. Thus, the purpose of this study was to test the organoleptic results of Corn-cowpea cookies with corn flour and cowpea flour as the basic ingredients. This study consisted of three combination treatments of corn flour and cowpea, namely P1 (50: 50), P2 (80: 20), and P3 (90: 10) with 3 replications. Assessment of organoleptic quality was carried out to 25 panelists which included crispness, texture, taste, color and smell. The data obtained were analyzed descriptively in the form of hedonic percentages of panelists on products with categories of strongly dislike, dislike, somewhat like, like, and really like. The results showed that on the crispness variable as much as 12% of the panelists really liked the P2 treatment (80: 20). On the texture variable, 20% of the panelists really liked the P2 treatment. For the taste variable, 8% of the panelists really liked the P3 treatment. On the color variable, 16% of the panelists really liked the P3 treatment, and for the smell variable, 12% of the panelists really liked P3. Based on these results, it can be concluded that for the variable of crispness and texture, the panelists liked the P2 treatment the most, while for the taste, color, and smell variables, the panelists liked P3 the most. Thus, the most acceptable treatment by the panelists was the combination treatment of corn and cowpea flour 80: 20 and 90: 10 (P2 and P3).

Keywords: organoleptic traits, corn, cowpea, cookies composition

1. Introduction

Diabetes mellitus (DM) is a chronic disease which was caused by an imbalance in the metabolism of fats, proteins and carbohydrates (Al Mansour, 2020). This metabolic disorder is caused by the hormone namely insulin cannot be synthesized by the body, or it is produced but does not work normally (Chaudhary & Tyagi, 2028). The state of diabetes in sufferers, is characterized by high levels of sugar in the blood (Soewondo et al., 2013), and lasts for a long time (Awuchi et al., 2020). According to Olokoba et al. (2020) since 1936, diabetes has been differentiated between type 1 DM and type 2 DM. Lifestyle such as lack of exercise, smoking, consuming alcohol, stress, diet, and obesity are the most likely to increase the risk of type 2 DM and will increase. Prevalence is high from year to year not only at the age of 20-70 years but also at the age of under 20 years, especially in developing countries. In Indonesia, diabetes is a major health problem (Ligita et al., 2019) and has also become a major cause of death. It is estimated that the same pattern will continue if there is no proper treatment and prevention (Ligita et al., 2019), especially with the Covid-19 Pandemic, handling becomes difficult when patients have comorbidities such as diabetes mellitus.

Basically, diabetes can be prevented by keeping sugar levels within a normal range. This is also done to prevent the development of other degenerative diseases which are complications of diabetes such as hypertension, cardiovascular, kidney, nepropathy, blindness, and even death. According to WHO (2013) until now type 1 DM is not clearly known, its causes and ways of handling it, while type 2 DM can be prevented but really depends on age, sex, condition or medical history, body weight, and also the intention to recover. In general, type 2DM can be overcome by maintaining normal sugar level, and body's calorie intake by adjusting lifestyle and eating patterns (Asif, 2014).

Food consumption to maintain blood sugar levels is food that has a low glycemic index value, low calories, low sugar, high fiber, does not contain artificial sweeteners, low in fat, does not contain trans fats, high protein, and also low in salt content. One of the characteristics of diabetics is a continuous feeling of hunger or polyphagia (Awuchi et al., 2020). This causes diabetics to always want to eat even outside of normal meal times. However, consumption of foods with high calories and glycemic index has the potential to increase blood sugar levels (Triandita & Putri, 2020). Therefore, it is necessary to find alternative foods that do not have the potential to increase blood sugar levels, but can make sufferers feel full, have a low glycemic index, and contain nutrients that can maintain the health of diabetics. These alternative foods can be like crackers, snacks, biscuits or cookies that can be eaten as side dishes between main meals (Widiawati & Anjani, 2017). The use of corn as an antidiabetic functional food is by combining or mixing it with other ingredients such as nuts. One type of bean that can be combined with corn is cowpea. Kisar Island, Southwest Maluku Regency is very rich with local genetic resources such as corn and cowpea. Although corn and cowpea in Indonesia have been widely reported as alternative foods for diabetics (Inayah et al., 2020), specifically for local corn and cowpea from Kisar Island South West Maluku District has never been reported. According to Sinay and Harijati (2020) the local corn seed from Kisar Island had nutritional content, such as fat (3.4-5.1%), protein (9.14-13.02%), crude fiber (2.17-2.72%) %), total carbohydrates (69.7-75.74%), and total sugar (58.6-68.7%), whereas Karuwal et al. (2021) also reported that cowpea from Kisar Island had a very low fat content (0.58- 2.03%), and very high protein (15.5-22.84%). Sinay et al. (2022) also reported about the presence of bioactive compounds such as flavonoids and phenolics as well as the presence of very strong free radical inhibitory activity equivalent to quercetin. On the other side, several other researchers have reported that corn and cowpea also contain carotenoid, phenolic, and antioxidant properties (Ariviani et al., 2020). With the nutritional content found in corn and cowpea, both of them can be used as raw materials for making alternative foods for diabetics such as cookies. In relation to making cookies, it is necessary to know the exact formulation of corn flour and cowpea flour, especially for local varieties from Kisar Island, hence they can be used as an alternative food for diabetics. The purpose of this study was to determine the organoleptic quality of corn-pea cookies made from corn flour and cowpea flour as the basic ingredients.

2. Methods

Seeds of local varieties of corn and cowpea were harvested from their planting side in Kisar Island. The seeds used are physiologically ripe for the making of flour as a basic ingredient for corn-

cowpea cookies. Seeds that have been collected are then sorted and weighed as much as 1 kg. Then grinded using a blender and sifted using a sieve with a size of 80 mesh. After that it was weighed again to determine the final weight.

The composite of corn flour and cowpea flour consists of three combinations namely P1 (70:30), P2 (80:20), and P3 (90:10). Cookies production was conducted following procedure which proposed by Oluwamukomi et al. (2011). The ingredients for making cookies consist of powdered sugar (42.85 g), eggs (17.5 g), and margarine (35.70 g) were stirred using a mixer until fluffy. Powdered milk, baking powder and vanilla were added. Furthermore, a mixture of corn flour and cowpea flour according to the composite ratio was added and mixed until smooth. After that the dough was printed and baked at 180º C for 15-20 minutes.

Organoleptic quality testing includes color, texture, smell, and taste with a score or scale consist of one to five with categories as (1) very dislike, (2) dislike, (3) some what like, (4) like and (5) very like (Yuniarti and Dwiani, 2021). The instruments were given to 25 untrained panelists (Roudauta et al., 2002) who ever been consumed biscuits. Every change of consumption between one treatment and another, the panelists were given mineral water to neutralize the taste in their mouths. Data on organoleptic quality test results is the average (mean ± SD) of 25 panelists, and displayed in graphical form and qualitatively described.

3. Results and Discussion

In order to determine the quality of corn-cowpea cookies, organoleptic tes was carried out which included crispness, texture, taste, color, and smell. Organoleptic test is a test that is sensory by utilizing the human senses in identifying the sensory attributes of a product. One way to determine organoleptic quality is by hedonic value or preference index.

a.   Crispness

One of the main characteristics of cookies or biscuit products is their crunchy nature. Crispness relates to the ability of a biscuit product to disintegrate when bitten (Roudauta et al., 2002). According to Jagat et al. (2017) the crunchiness of biscuits is caused by a decrease in water content due to the roasting process. The crunchiness of a biscuit is also determined by how much pressure is required to crush the biscuit. If the pressure value is small, the biscuits will be crunchier. In other words, crunchy biscuits are biscuits that crumble easily when pressed (Roudauta et al., 2002). The results of testing the crispness of corn-cowpea cookies are shown in Figure 1.
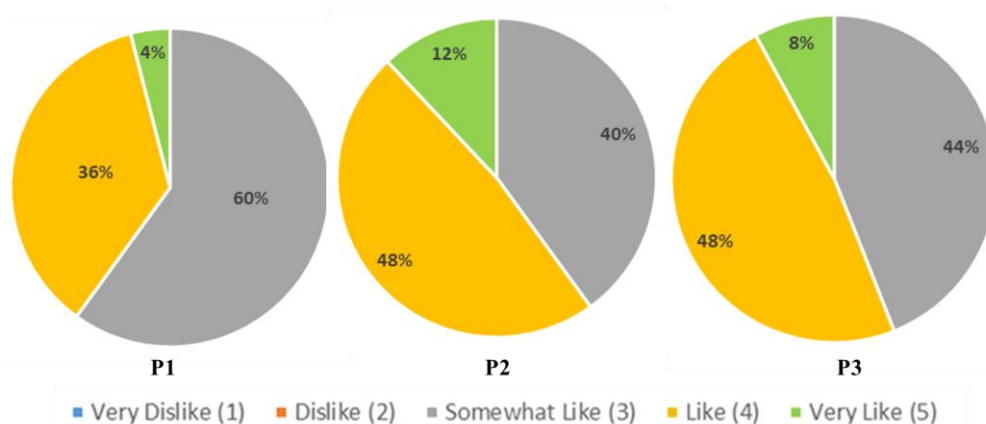
Figure 1. Organoleptic test result for crispness of corn-cowpea cookies

Figure 1 show that the P1 treatment as much as 60% of the panelists somewhat liked for corn-cowpea cookies, while P2 and P3 the percentage of panelists who like was higher than somewhat liked. This shows that panelists prefer cookies with a mixture of corn flour more than cowpea flour. P1 consist of 50% corn flour and 50% cowpea flour, while P2 and P3 treatments consist of 80% and 90% corn flour and 20 and 10% cowpea flour. This means that in P2 and P3 the composition of corn flour was more than cowpea flour. The presence of corn flour gives a crunchy nature to the cookies, so the panelists like it. The crunchiness of a biscuit product is also influenced by the content of wheat

flour in the product. The less flour added to the dough, the harder product will crumble or the less crunchy will be. Wheat flour contains gluten. The presence of gluten will gives a crunchy nature to the cookies. If the flour content is less, it was tend to less of the gluten content, which will result less crunchy cookies.

According to Harzau & Estiasih (2013), one factor that can affect the crispness value is the ratio of amylose to amylopectin. A high ratio of amylose to amylopectin can increase the crispiness of the product. In making these corn-cowpea cookies, the fixed volume is flour and granulated sugar, as much as 100 grams, while the volume of corn flour (CF) and cowpea flour (CPF) used varies according to the combination treatment. P1 treatment is the mixture of 50 : 50, CF and CPF, while P2 consist of 80 : 20 CF and TPF, and P3 consist of 90 : 10 CF and CPF. From this composition, it can be seen that the amount of flour used is very small. If there is little flour, the cookies should not be crunchy, but the results of the organoleptic quality test show that on average the panelists like the crispiness of the corn-pea cookies product. This shows that even though the amount of flour used is small, the cookie products made are still crunchy and are still liked by the panelists.

b.   Texture

Texture is an important characteristic of food products that can affect consumer acceptance. Texture is usually concerned with sensing or organoleptic testing of solids, i.e. the impression in the mouth after oral processes such as chewing and tasting (Muhlishoh et al., 2021). These impressions include the impression of powdery (mealy), gritty (sandy), the impression of sticky, rough, smooth, crumbly, oily, or watery (Nadimin et al., 2019).
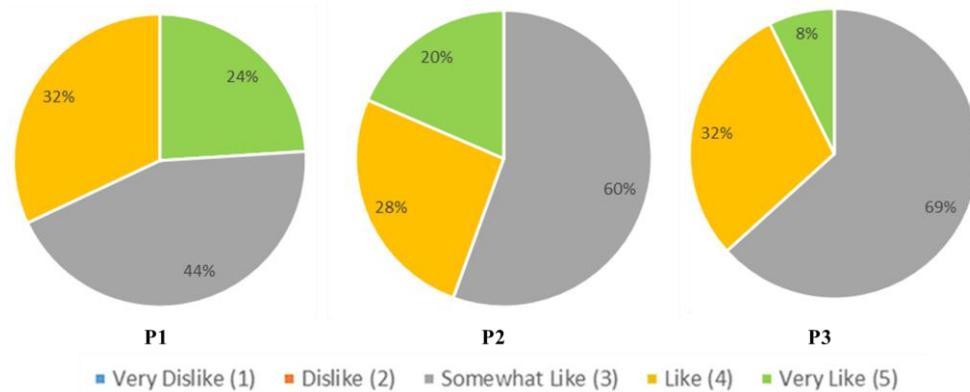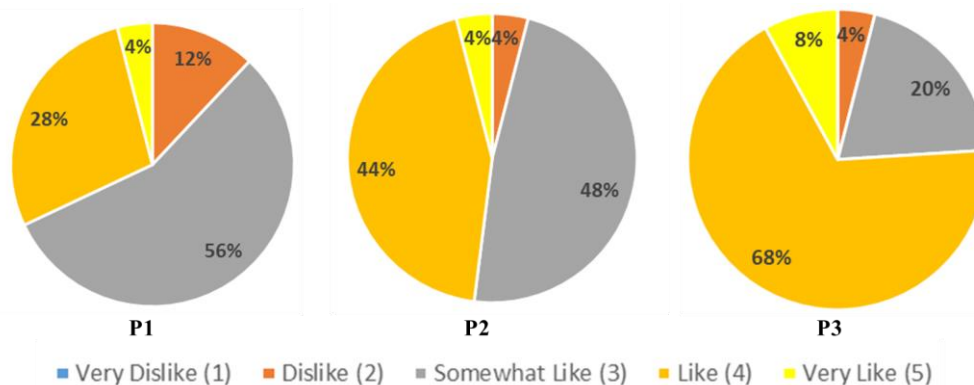

Figure 2. Organoleptic test result for the texture of corn-cowpea cookies

All treatments P1, P2 and P3 simultaneously showed a high percentage of panelists in the somewhat like category to the texture of corn-cowpea cookies (Figure 2). The presence of a mixture of corn flour and cowpea gives it a rough and sandy texture. This is the reason why the biscuits are liked by the panelists. In general, it was known that when people consumed biscuits, they tend to like a soft or smooth texture, and this is usually found in biscuit products made from wheat flour as the main ingredient. Panelists who are used to consuming biscuits made from wheat flour will acquire different characteristics when consuming biscuits made from a mixture of corn flour and cowpea flour. This isa reason why the panelists choosing rather like the cookie product.

c.   Taste

One of the factor that determine consumer acceptance of a product is taste. The taste of food is a combination of tasting stimuli, smells and experiences that involve the tongue a lot. Taste is formed from sensations that come from a combination of forming ingredients and their composition in a food product that is captured by the sense of taste and is one of the flavor supporters that supports the quality of a product (Nadimin et al., 2019).

Very Dislike (1) **Dislike (2)** **Somewhat Like (3)** **Like (4)** **Very Like (5)**

Figure 3. Organoleptic test result for taste of corn-cowpea cookies

The results of the panelists assessment of the taste of corn-pea cookies (Figure 3) varied for each combination of corn flour and cowpea flour. Panelist taste score in the P1 and P2 treatments is somewhat like to the taste, while the P3 treatment, the panelists preferred like to the taste of corn-cowpea cookies. It should be explained that in P1 (50 : 50) and P2 (80 : 20) and P3 (90 : 10) mixture of corn flour and cowpea flour. Corn flour and cowpea flour used in this study were made or processed manually and without any special treatment to remove the unpleasant taste that is usually found in beans. This is what is thought to be the cause of the panelists rather liking corn-pea cookies in the P1 and P2 treatments. For P3, because the volume of corn flour was much more than P1 and P2, the corn flavor was more prominent so that it covered the taste of beans, the panelists liked this. Even so, there were also panelists who didn't like and really liked the taste of corn-pea cookies at P1, P2 and P3, although with a small percentage. This shows that the taste assessment is very subjective, which means that with a little or a lot of corn flour and cowpea flour mixed, there will be always panelists who don't like, rather like, like, or really like the taste of the cookies.

d.   Color

Color is a physical attribute that is assessed first in determining food quality and sometimes can be used as a measure to determine taste, texture, nutritional value and microbiological properties (Nuraini & Purwani, 2017). Color affects the acceptance of a food ingredient, because generally the first acceptance of a material seen is color. Attractive colors will increase product acceptance. Color may change during cooking. This can be caused by the loss of some pigments due to the release of cell fluids during cooking or processing, thus further reducing the color intensity or even increasing the intensity of certain colors (Nadimin et al., 2019).


Very Dislike (1) **Dislike (2)** **Somewhat Like (3)** **Like (4)** **Very Like (5)**
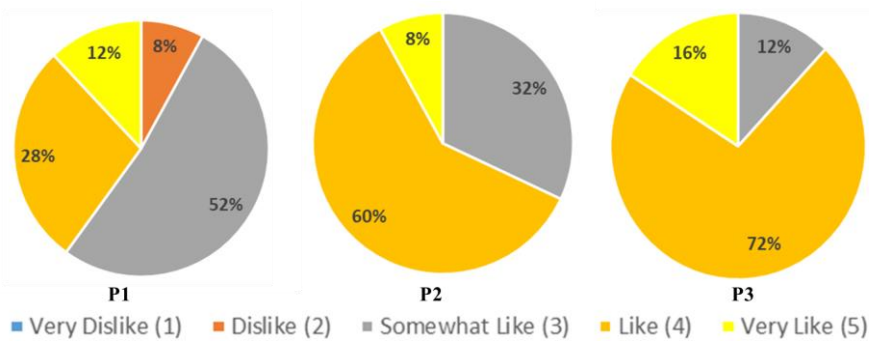
Figure 4. Organoleptic test result for the color of corn-cowpea cookies

The panelists generally preferred somewhat like the color of P1 treatmentr, while P2 and P3, generally the panelists like the color of the corn-cowpea cookies. Treatment P1 had a slightly dark brown color due to the influence of the amount of browned cowpea flour, and it got browner when heated in the oven. On the other hand, in P2 and P3, because there was more corn flour, the color was not dark brown as in P1. This was because the yellow color of the corn flour covered the pea color in P2 and P3, so the color of the corn-cowpea cookies was bright yellow, and this was liked by the panelists. However, just like taste, there were also panelists who didn't like and really liked the color at P1, P2 and P3. This is also due to subjective judgments depending on the preferences of the assessor. Someone maybe assumed that brown or dark colors are attractive, but for others, bright or

yellow is more attractive. This is the reason why there are still panelists who choose not to like or really like all of the corn-cowpea cookies.

e.   Smell

Smell is one of the parameters that influence the perception of the good taste of a food. In the food industry, smell testing is considered important because it can quickly provide an assessment of the production results, whether the production is liked or not by consumers (Lamusu, 2018). The smell of a product is determined when volatile substances enter the nasal passages and are responded to by the olfactory system (Muslishoh et al., 2021).
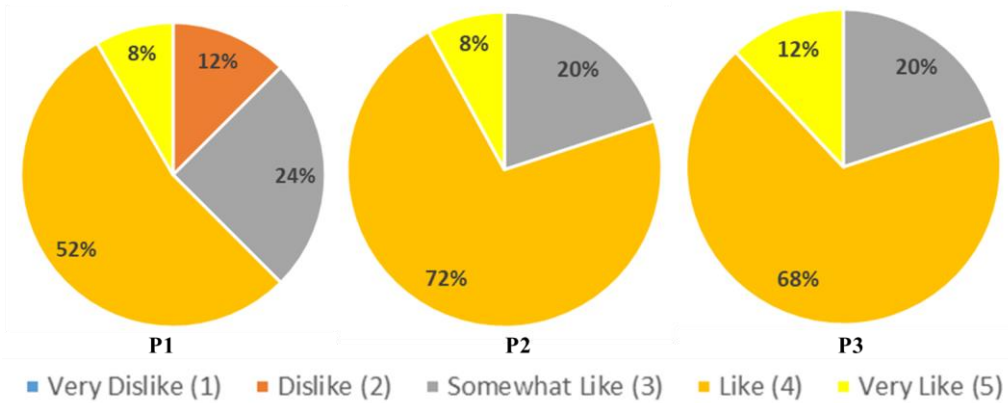
Figure 5. Organoleptic test result for the smell of corn-cowpea cookies

Corn-cowpea cookies are made using additional ingredients consisting of margarine and egg yolks with similar volume. This certainly gives a nice smell to the cookies. This is in line with the statement as proposed by Widiantara et al. (2018) that cookies smell was affected by the content of margarine, egg yolks, milk, and as well as flour. This is why the panelists like the smell of the cookies. Hence, the three treatments (P1, P2, and P3) got a high percentage in the like category respectively.

Based on the results of the organoleptic test, it can be seen that the panelists preferred the P2 treatment for crispness and texture, while the panelists preferred the P3 treatment for taste, color and smell. Therefore, the recommended combination of corn flour and cowpea flour is treatment P2 and P3. However, because this research is preliminary research, product specifications for diabetics are unknown. Therefore, further research is needed to determine the glycemic index of cookies and also testing the product to the experimental animals and also in diabetic patients, so that they can be developed as an alternative anti-diabetic food.

4. Conclusion

Based on this result, it can be concluded that the results of the organoleptic quality test showed that for the crispness and texture panelists really liked the P2 treatment, while for the taste, color and smell the panelists liked   P3 treatment. The treatment that was most acceptable to the panelists was the combination treatment of corn and cowpea flour 80 : 20 and 90 : 10 (P2 and P3).

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