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Khamir Cake with Sweetener Variations as a Potential Snack for People with Type II Diabetes Mellitus

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ABSTRACT

Khamir is a traditional cake mostly found in Pemalang City, Central Java, Indonesia. This cake was an acculturation product from Arab and Pemalang cultures, so this cake is commonly consumed by people of Pemalang and Arabic descent. Khamir cake is made primarily from a large quantity of wheat flour and sugar. Due to its high sugar content, people with diabetes of history of diabetes are not suggested to consume this cake. This study aims to explore healthy food development (theoretical), produce khamir cake alternative for people with type II diabetes mellitus (practical), along with exploring consumers' preferences for khamir cake made from brown sugar, honey, stevia sugar, and corn sugar (practical). This research was quantitative experiment research. We used a questionnaire as an instrument to gather the respondents' preferences for the produced alternative khamir cake. In this study, we prepared khamir cake with the sugar variation from brown sugar, honey, stevia sugar, and corn sugar.

I. Introduction

The cake is a traditional snack made from rice flour, wheat flour, glutinous rice flour, and others. Every region has different conventional cakes, and, commonly, they are sweet and savory. There are two types of traditional cake, namely wet and dried cake (Zafira & Kamal, 2017). We can easily find cakes being sold in traditional markets or cake shops.

Khamir is one of the traditional wet cakes with a sweet and tasty flavor, which is primarily found in Pemalang City, Central Java, Indonesia. A study carried out by Ningtias (2017) suggested that khamir cake is an acculturation cuisine product derived from Arab and Java cultures induced by the abundant Arabians who came to Pemalang Regency to trade during that period. While trading, these Arabians traders also interacted with Pemalang society which assembled a community that stayed in Pemalang. The name "*Khamir"* was derived from the word *Khamer* which means intoxicating. The cake was named khamir since it contains yeast which required its dough to be set aside for hours to let the cake dough rises before it is molded. Considering its preparation process, the khamir cake is divided into two, namely, the khamir cake made from rice flour and wheat flour. Both of those cakes have the same savory taste. Recently, khamir cake has been one of the sweets popular among the tourists visiting Pemalang Regency.

Ayuwardani (2018) described that Diabetes Mellitus or DM is a chronic progressive illness marked by hyperglycemia. Hyperglycemia is a condition where an individual has a high blood sugar level induced by food consumption and ignorance of a healthy lifestyle (Lutfi, 2019). Someone with Diabetes Mellitus needs to check their glycemic index continuously, as the low glycemic index aids an individual controls their blood sugar level. Diabetes can be threatening if it is not treated immediately. Besides, the death rate of diabetics is higher than that of non-diabetics (Zulaikha, Sureskiarti, & Herlina, 2020). Therefore, diabetes mellitus can be overcome by implementing a healthy lifestyle by consuming healthy food and exercising regularly. Diabetes Mellitus is induced by the sudden increase of blood sugar due to the low performance of the insulin hormone. Without proper treatment, diabetes mellitus may result in complications (Adrial, 2018). One of the means to avoid type 2 Diabetes Mellitus is by restricting sugar consumption. Additionally, granulated sugar is a type of simple sugar, so if someone uncontrollably consumes food and beverages containing granulated

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sugar, then his blood sugar level will increase sharply. Consequently, this study aimed to create khamir cake by altering the granulated sugar with an alternative sweetener. A study carried out by Rosiana and Khoiriyah (2018) uses honey and cider as the sweetener replacing granulated sugar in the preparation of yogurt.

In this study, we used brown sugar, honey, stevia sugar, and corn sugar as a substitute for granulated sugar. These sweeteners were selected considering a number of reasons. For instance, we selected brown sugar because it offers 35 glycemic content, far lower than the glycemic content of granulated sugar (64) (Saptarina, 2017). Meanwhile, the corn sugar and stevia sugar were selected due to they have white color, which will not transform the color of khamir cake. We formulated this alternative khamir cake because this cake because people consume it daily as a snack. Besides, it also has a soft texture and is satiated, so people consume it to delay their hunger. Also, this cake is frequently served during special events, such as engagements, thanksgiving, or welcoming guests of honor (Ningtias, 2017).

This study develops khamir cake with lower sugar levels so that it can be consumed by people with diabetes mellitus. Also, this study aims to identify the consumers' preferences for khamir cake made from alternative sweeteners, such as brown sugar, honey, corn sugar, and stevia sugar.

Khamir cake is a traditional cake that originated in Pemalang City, Tegal, Central Java, Indonesia. A study conducted by Darmawan (2016) stated that khamir cake has a similar round shape as *apem* cake. However, this khamir cake is thicker than *apem*, so it satiates to be consumed. khamir cake is an acculturation product from Javanese and Arabic cultures (Ningtias, 2017). Besides, this cake is tasty and devoured daily. Darmawan (2016) argued that the name of khamir cake comes from the term *khamer*, which means intoxicating. This cake has been an identity of Pemalang Regency (Ningtias, 2017).

Khamir cake has also been one of the exceptional food from Pemalang. This cake is made from medium protein flour (all-purpose flour), granulated sugar, yeast, egg, margarine, and coconut milk. The dough can also be added with Ambon banana or cassava tape to enhance the flavor (Ningtias, 2017). After the ingredients have been properly blended, it is set aside for 3 to 6 hours for the fermentation process. The fermentation process aids the dough in rising perfectly so that the cake can be porous and has volume. Then, the khamir cake is molded using the *apem* or *dorayaki* mold. For the cooking process, the cake mold is smeared with a little oil or margarine, and then the dough is poured and cooked on low heat for 5 to 7 minutes before it is reversed (Darmawan, 2016).

The influencing factors of soft and expanded khamir cake preparation include: 1) great quality of ingredients (Darmawan, 2016), such as using fresh cake and clean flour free from fleas and small pebbles; 2) the duration of dough mixing, in which a short mixing period results in not perfectly rising dough, while too long mixing period lowers the gluten power, so that the dough becomes too soft; and 3) the fermentation process should be precise, not too fast or too lengthy, while this process is highly influenced by the room temperature and yeast.

A. Diabetes Mellitus

Someone can get diabetes due to chronic hyperglycemic syndrome and metabolic disorders (Jasri & Nazli, 2018). People with diabetes frequently feel hungry since their insulin is inactive, so their bodies are unable to absorb sugar (Zulaikha et al., 2020). There are two types of diabetes mellitus, namely diabetes mellitus type 1 and 2, which are induced by different causes.

Type 1 diabetes occurs due to diabetic ketoacidosis (DKA). People with type 1 diabetes are unable to produce insulin, or sometimes they have only low insulin levels, so they should attain insulin from outside their body. The symptoms of type 1 diabetes include frequent fatigue, frequent urination, and thirst.

In contrast to people with type 1 diabetes, people get type 2 diabetes due to their excess weight (Adrial, 2018). Besides, type 2 diabetes can also be induced by the inability of the pancreas to perform maximally, affecting insulin production (Zulaikha et al., 2020). Initially, the symptoms of type 2 diabetes are similar to type 1 diabetes, but people with type 2 diabetes often show no symptoms.

Up to recently, there has not been an antidote for diabetes. It can only be controlled by maintaining the blood sugar level through adjusting the granulated sugar consumption, as granulated sugar has a glycemic index of 64 (Saptarina, 2017).

B. Sugar

According to the dictionary, sugar is defined as a sweetener made from sugarcane, palm, or coconut, frequently in the form of crystals (Jumriani, Pasigai, & Hidayat, 2019). Sugar has an essential role in the preparation of khamir cake as it gives a sweet and savory taste to the cake while also activating the yeast so that the dough rises perfectly. Commonly, khamir cake is made from granulated sugar. Granulated sugar is a type of simple carbohydrate that can rapidly accelerate the blood sugar level of people with diabetes. However, granulated sugar can be replaced by other sweeteners, such as brown sugar, honey, corn sugar, and stevia sugar.

Brown sugar is a natural sweetener made from a palm tree (Saptarina, 2017). This sugar has a unique light and dark brown color, depending on the origin of the palm tree used as its ingredient. Besides, brown sugar also offers a lower glycemic index than granulated sugar, making it less harmful to be consumed by diabetic people. In a previous study, brown sugar was used as a sweetener in the preparation of *nata de tomato*.

Honey is another natural sweetener obtained through leaves and flowers, previously sucked by bees (Rosiana & Khoiriyah, 2018). It is liquid and abundantly available in various places. It is frequently added to different foods and beverages, such as in yogurt.

In addition, stevia sugar is also a natural sweetener from stevia leaves. It has low calories even if it offers high sweetness. Stevia has also been used in the preparation of *empon-empon* syrup (Aina, Ferdiana, & Rahayu, 2019). Meanwhile, corn sugar is a natural sweetener containing fructose, a natural sweetener from corn (Utomo & Wahyudi, 2017). It has a crystal shape and pure white color. This sugar can be consumed by people with diabetes as it contains lower calories than granulated sugar.

II. Method

In this study, we used a quantitative approach with an experimental method. A quantitative study describes the obtained data in the form of a number, so it has accurate data. Meanwhile, the experimental method is a method used in attaining the effects of treatment on the controlled condition (Aprilia, 2022). A study by Purnamasari (2022) showed that the experimental method could also be used to attain the best results from several trials.

In the initial stage, we prepared khamir cake using the standard recipe to ensure that the recipe produced khamir cake with excellent texture, color, aroma, and flavor. For the tools, we used a digital scale, measuring glass, bowl, mixer, khamir mold, and stove. Meanwhile, for the ingredients, we used medium protein wheat flour, granulated sugar, instant yeast, margarine, baking soda, water, and eggs. In this process, we ensured that all of the ingredients were good and fresh, such as fresh eggs, along with clean and dried tools.

A. Stages of Product Preparation

The ingredients of our khamir cake included: 1) medium protein wheat flour (*segitiga biru*); 2) margarine (*blueband*); 3) sweetener, consisting of granulated sugar merk *gulaku*, 100% brown sugar (light brown color), stevia sugar merk Tropicana slim, and corn sugar merk Tropicana slim; 4) boiled water; and 5) baking soda and instant yeast.

Firstly, we beat the eggs until they rise. We added the medium protein flour, instant yeast, dissolved baking soda, and melted margarine. After that, we gradually added water to regulate the dough's consistency. Then it was set aside for three hours. After three hours, the dough was ready to be molded using the khamir mold. In cooking the cake, we bake it at 100° C temperature. In the end, we successfully prepared the savory khamir cake. The flowchart of khamir cake preparation is presented in Figure 1.

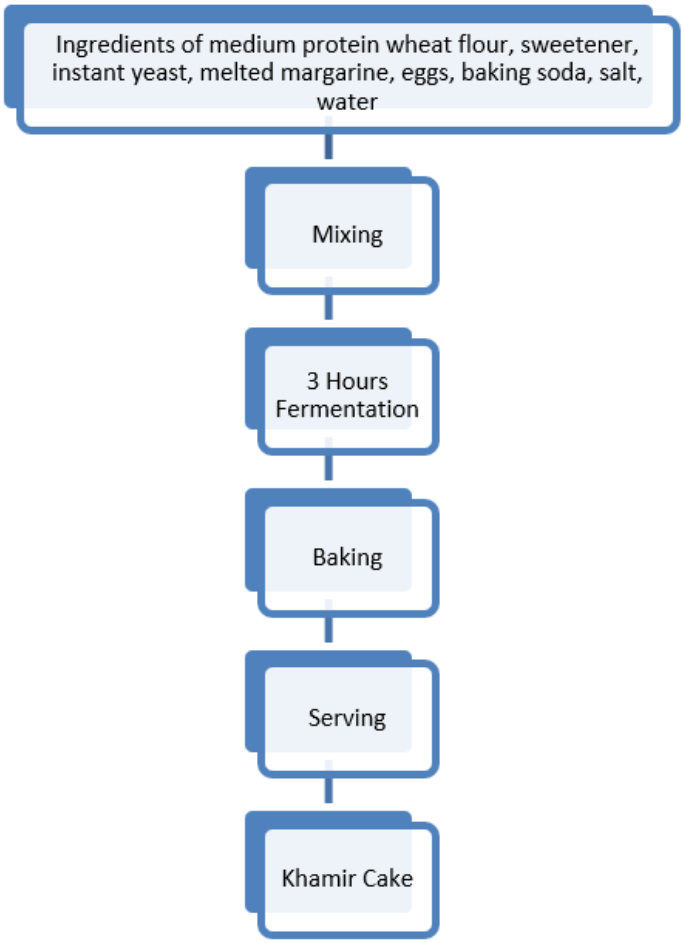

Fig. 1. Flowchart of Khamir Cake Preparation

B. Research Variable

1) Dependent Variable

In this study, the dependent variable affecting the khamir cake is the sweetener used to substitute the granulated sugar. The ingredients of khamir cake are presented in Table 1.

Table 1. Ingredients of Khamir Cake

Ingredients	Control*	K1**	K2**	K3**	K4**
High protein wheat flour	500 g	500 g	500 g	500 g	500 g
Granulated sugar	250 g	-	-	-	-
Brown sugar	-	250 g	-	-	-
Honey	-	-	250 g	-	-
Corn sugar	-	-	-	62,5 g	-
Stevia sugar	-	-	-	-	65 g
Instant yeast	6 g	6 g	6 g	6 g	6 g
Margarine	100 g	100 g	100 g	100 g	100 g
Eggs	1	1	1	1	1
Baking soda	½ tbsp	½ tbsp	½ tbsp	½ tbsp	½ tbsp
Salt	½ tsp	½ tsp	½ tsp	½ tsp	½ tsp
Boiled water	525 g	525 g	525 g	525 g	525 g

K1* recipe with the addition of 250 g palm sugar K2** recipe with the addition of 250 g honey K3** recipe with the addition of 62.5 g corn sugar K4** recipe with the addition of 65 g stevia sugar.

2) Independent Variable

This khamir cake research positioned the sensory attributes of khamir cake as the independent variable. In this study, we carried out the test of favoritism. Meanwhile, in this study, we examined the respondents' preferences for khamir cake made from alternative sweeteners of stevia sugar, corn sugar, brown sugar, and honey, along with the effects of sweetener substitution on the cake's color, taste, aroma, and texture.

C. Data Collection

We collected data from 30 panelists, with criteria of adult-elderly (21-70 years old) (21- 70 years old) (Fadlilah, Sucipto, & Amestiasih, 2019), with some of them having a history of type 1 or 2 diabetes mellitus. The consumers' preference test was tested using the sensory test and the favoritism test.

D. Data Processing

The data processing was carried out after we gathered all the data to generate an accurate conclusion of the study. In this process, we used the one-way ANOVA test (Rehena & Ivakdalam, 2019). If the result was significant, it was followed by a DMRT test with a confidence level of (α) = 0.05 (Seko, Sabuna, & Ngginak, 2021).

III. Results and Discussion

The sensory test of khamir cake with different sweetener variations consisted of a test on the cake's color, aroma, flavor, and texture. The results showed different preferences for each khamir cake formulation.

A. Characteristics of Respondents

The samples in this study were khamir cake made from different sweeteners, consisting of brown sugar, honey, stevia sugar, and granulated sugar (control). This study involved 55 respondents, with 15 of them having a history of diabetes mellitus, while the other 40 respondents had no history of diabetes mellitus. All respondents were around 20 to 70 years old, as presented in Table 2.

Table 2. Respondents' Characteristics

No	Percentage	Gender	Range of Age	Diabetes/Non Diabetes	Total
1	13%	Male	31-40	Non-diabetes	1
			41-50	Diabetes	1
			51-60	Non-diabetes	1
			51-60	Diabetes	1
			61-70	Non-diabetes	3
2	87%	Female	21-30	Non-diabetes	9
			31-40	Non-diabetes	11
			41-50	Non-diabetes	10
			41-50	Diabetes	2
			51-60	Non-diabetes	4
			51-60	Diabetes	4
			61-70	Non-diabetes	1
			61-70	Diabetes	7

B. Preference Results of Khamir's Organoleptic

In our preference test instrument, we used the Likert scale. The Likert scale is one of the most common measurement scales in the questionnaire (Taluke, Lakat, & Sembel, 2019). In this study, we used a scale ranging from 1 to 5, in which 1 represents strong dislike, 2 means dislike, 3 represents neutral, 4 means like, and 5 means strong like. The results of questionnaire of khamir cake preference are presented in Figure 2.

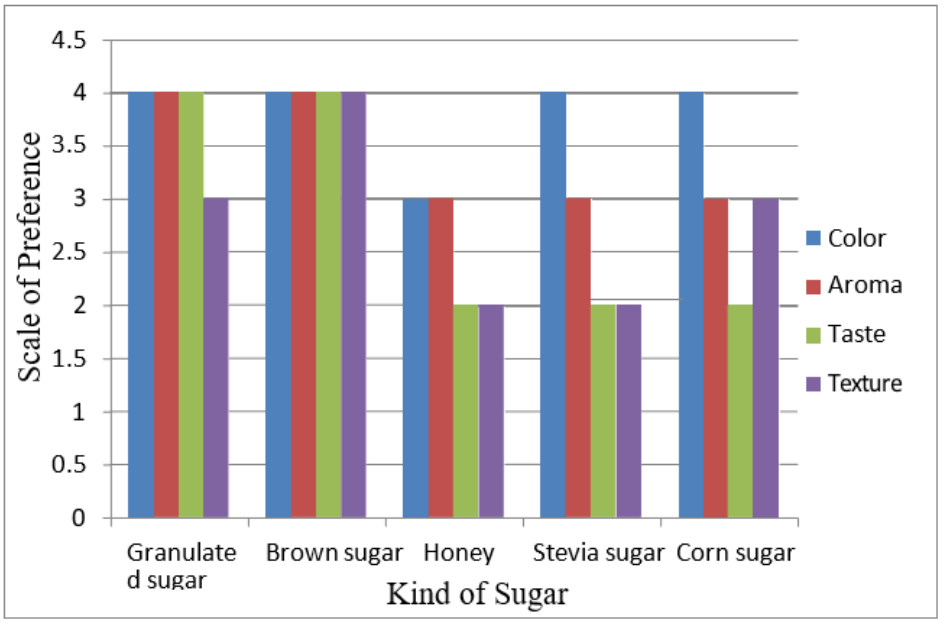

Fig. 2. Results of Questionnaire of Khamir Cake Preference

For the aspect of color, the respondents almost equally preferred the khamir cake made from all different sweeteners, as illustrated in Figure 2. Meanwhile, for the element of aroma, the khamir cake from granulated sugar (control) and brown sugar became the preferable ones compared to the khamir cake with another sweetener (honey, stevia sugar, and corn sugar). Most of the respondents preferred the taste of khamir cake from granulated sugar (control) and brown sugar. Besides, the respondents also favored the texture of khamir cake from brown sugar. In contrast, the respondents did not like the taste and texture of khamir cake from honey and stevia sugar, along with the flavor of khamir cake from corn sugar, as indicated by the low score (2).

The results of respondents' evaluation of the khamir cake's color showed that most of them preferred the cake made from granulated sugar (control), then followed by the cake from corn sugar, as illustrated in Figure 3. The third most preferred khamir cake was made from brown sugar and stevia sugar, as they attained a score of 4 (like). Meanwhile, the khamir cake made from honey achieved a score of 3 (neutral). This result may be induced by the highly distinct color of khamir cake from granulated sugar compared to the cake from other sweeteners.

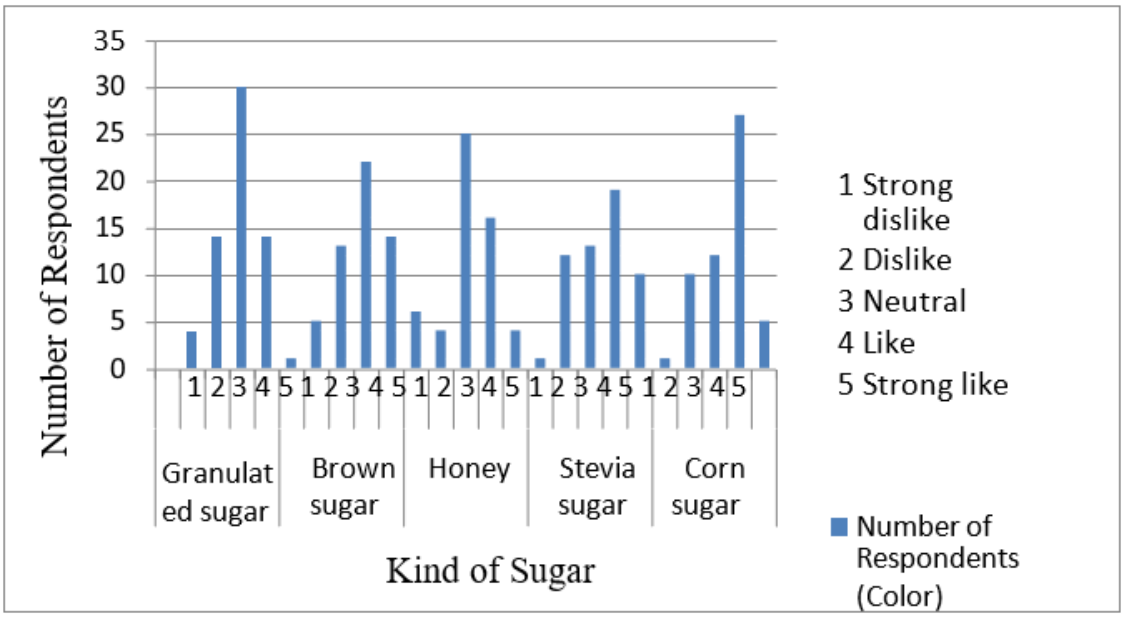

Fig. 3. Respondents' Evaluation of the Khamir Cake's Color

Our results suggested different results for every khamir cake made from different sweeteners, in which each khamir cake attained the highest score of 3 (neutral), as shown in Figure 4. The preferable khamir cake, from the elements of aroma, was made from granulated sugar (control), followed by the khamir cake made from brown sugar. Meanwhile, the khamir cake from the honey, stevia sugar, and corn sugar attained the average score of 3 (neutral) and 4 (like).

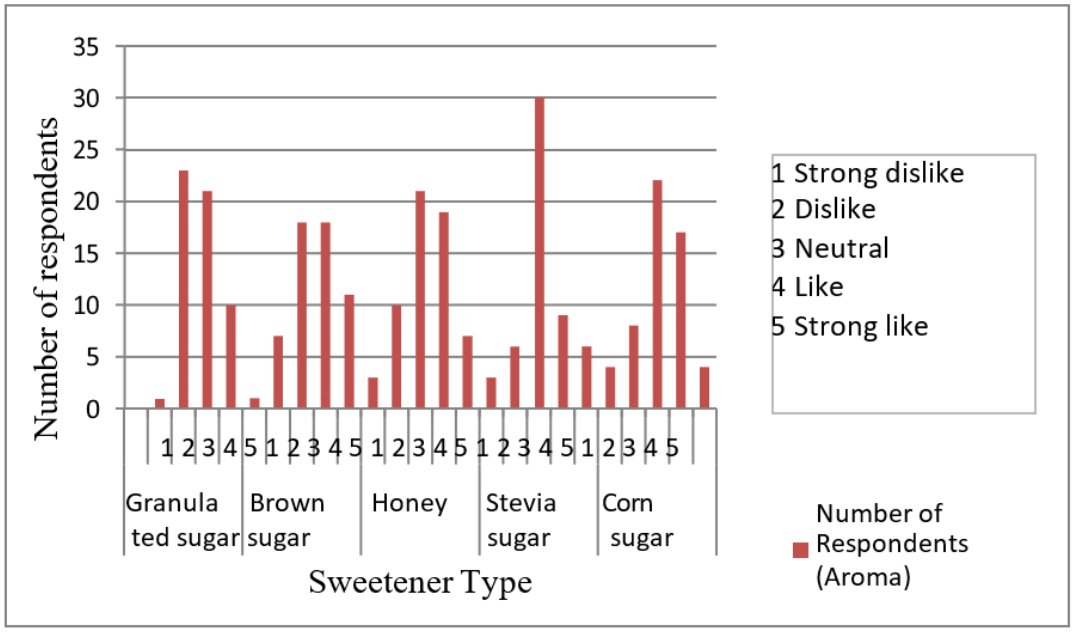

Fig. 4. Respondents' Assessment of Khamir Cake's Aroma

Similar to other aspects, in the element of taste, the results from each khamir cake formulation are also distinct, with the khamir cake from brown sugar being the most favorable, as shown in Figure 5. Khamir cake from brown sugar attained the highest score of 4 (like) among the other khamir cakes. Contrastingly, the khamir cake made from honey became the least favorable cake as it attained an average score of 2 (dislike). Further, the khamir cake from stevia and corn sugar achieved an average score of 3 (neutral) and 2 (dislike).

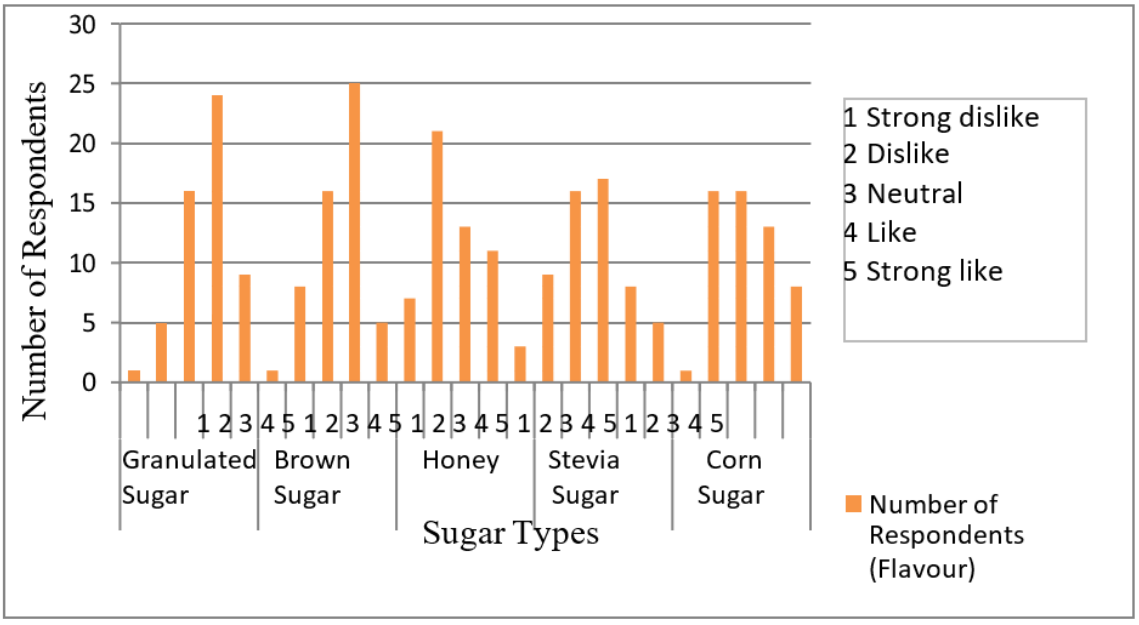

Fig. 5. Results of Respondents' Evaluation of Khamir's Flavor

The results of respondents' assessment in the aspects of texture showed that the khamir cake made from granulated sugar (control) and brown sugar attained the highest average score of 4 (like) and 3 (neutral), as illustrated in Figure 6. Conversely, the respondents tended to dislike the khamir cake made using honey, and stevia sugar, as both khamir cakes got the highest score of 2 (dislike). Lastly, the khamir cake from corn sugar attained the highest score of 3 (neutral).

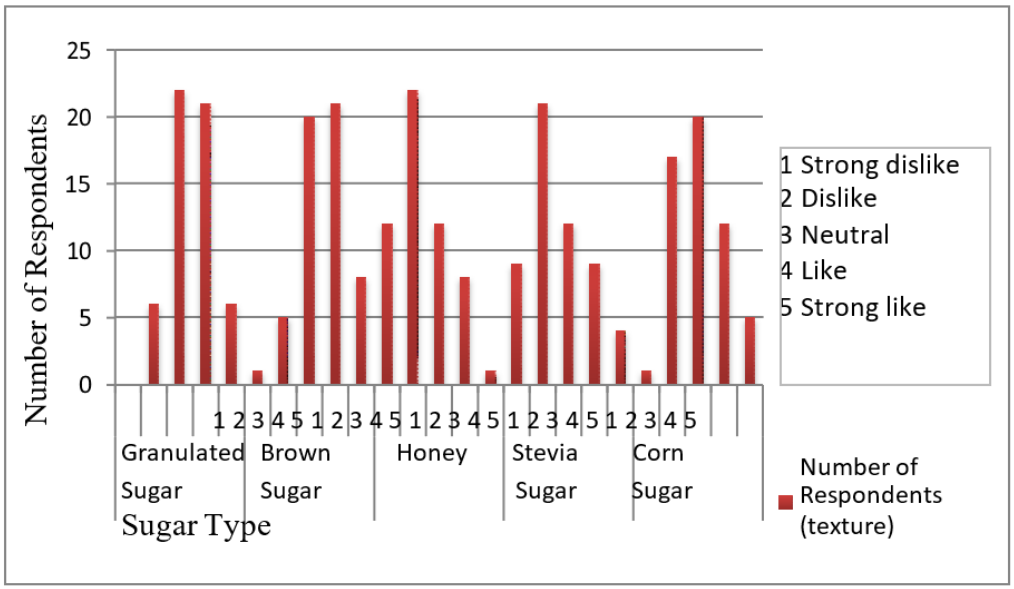

Fig. 6. Results of Respondents' Evaluation of Khamir's Texture

Further, the obtained preference test results were evaluated using the Kendall test. This Kendall test is a non-parametric test to identify the different effects of dependent and independent variables (Nasriyah, Cholifah, & Qasanah, 2022). The Kendall test results on the five khamir cake formulations showed different or significant results on the cakes' color, aroma, flavor, and texture, as shown in Table 3. It is shown by the obtained (P) value lower than 0.05 for all khamir cakes. The different scores were later tested using the Wilcoxon test. The Wilcoxon test is an advanced test to measure the relationship between variables.

Table 3. Preference Test Results for Khamir Cake Using Kendall Test

Sensorics Attribute	Types of Sweeteners Substituting Granulated Sugar					P/Sig
	Granulated sugar (control)	Brown sugar	Honey	Stevia sugar	Corn sugar	
Color	3.35	3.41	2.44	2.89	2.91	0.001
Aroma	3.54	3.33	2.69	2.75	2.70	0.001
Flavor	3.74	3.53	2.31	2.38	3.05	0.000
texture	3.74	3.83	2.05	2.35	3.04	0.000

Our analysis results indicated that different sweetener carries different effects on the respondents' khamir cake preferences, signified by a lower than 0.05 sig value, as shown in Table 4. These different results were observed in all investigated sensory attributes, including color, aroma, taste, and texture. The khamir cake made from brown sugar has the darkest brown color than the khamir cake made from other sweeteners since the brown sugar has the original brown color (Saptarina, 2017). Besides, this khamir cake also presents the lowest brightness level (Triachdiani & Murtini, 2021). However, according to our respondents, the khamir cake made from brown sugar is preferable since the cake looks more alluring than the khamir cake made from other sweeteners.

Our produced khamir cakes also have a different aroma. The study carried out by Aina et al. (2019) suggested that stevia sugar carries no smell, so it has no contribution to the aroma of processed food. Additionally, most of our respondents prefer the aroma of khamir cake made from granulated sugar (control). They also mentioned that this khamir cake from granulated sugar offers the best aroma. The respondents' preference for khamir cake using granulated sugar is affected by their familiarity with the sweetness of granulated sugar. Besides, research carried out by Laga, Langkong, and Muhpidah (2019) explains that granulated sugar offers a sweetness balance, even during the acid condition, as

the khamir cake dough preparation involves a fermentation process, so the dough made from granulated sugar presents an outstanding sweetness balance.

In addition, our respondents preferred the texture of khamir cake made using brown sugar, compared to the one from granulated sugar. Also, the different final flavor was also observed among the khamir cake made from different sweeteners, including granulated sugar (control), brown sugar, honey, stevia sugar, and corn sugar.

The different obtained scores were tested using the Wilcoxon test. The color attributes of khamir cake from honey are significantly distinct from khamir cake made from granulated sugar, as presented in Table 4. Honey has a quick crystal transformation at 14 degree Celsius (Djajasentana & Samboh, 2020). Consequently, the khamir cake made from honey has different brown caramel color from the respondents' preference. Meanwhile, generally, the khamir cake from brown sugar has a non-significant difference from the khamir cake from granulated sugar (control) in the aspects of color, aroma, taste, and texture, so the khamir cake from brown sugar can potentially substitute the ordinary khamir cake made from granulated sugar (control).

Table 4. Results of Wilcoxon Test for Khamir Cake Preferences

Sensory Attributes	Types of Sweeteners Substituting Granulated Sugar			
	Granulated sugar (control)	Brown sugar	Honey	Stevia sugar
Color	0.710	0.003*	0.052	0.063
Aroma	0.418	0.010*	0.001*	0.001*
Flavor	0.131	0.000*	0.000*	0.004*
texture	0.807	0.000*	0.000*	0.035*

*Value of sig = P < 0.05

The khamir cakes made with sweeteners from honey, stevia sugar, and corn sugar presented significantly different aromas. The results of the Wilcoxon test also confirmed that the khamir cake made from sweetener of honey, stevia sugar, and corn sugar had a significantly different aroma from khamir cake made from granulated sugar (sugar). The khamir cake from honey produces the unique smell of honey, which is similar to a flower. It occurs due to honey is naturally derived from the essence of flowers (Yulia, Azra, & Ranova, 2022). Meanwhile, the khamir cake made from stevia sugar produced no aroma. Linearly a previous study conducted by Aina et al. (2019) emphasized that stevia sugar has no aroma.

The Wilcoxon test results also showed significantly different sensory attributes on the khamir cake made from honey, stevia sugar, and corn sugar. A remarkably low score of 0.000 was obtained for the khamir cakes from honey and stevia sugar. Meanwhile, the khamir cake made from honey presented the sweetest taste compared to the cakes made from other sweeteners. Besides, the khamir cake from stevia sugar also had a different taste compared to khamir cake made from brown sugar, honey, and corn sugar. The khamir cake from stevia sugar had a sweet taste, but it ended with a little bit of bitter taste (Purnamasari, 2022).

The sensory attributes of khamir cake were also significantly different from the khamir cakes made from honey, stevia sugar, and corn sugar. The lowest significant score was attained by the khamir cake from honey which also presented a semi-wet dense texture so that many respondents perceived the cake as undercooked. It may be caused by the honey which originated from the flower (Rosiana & Khoiriyah, 2018). Besides, the khamir cake from stevia sugar had the hardest (non-soft) and dried texture compared to the khamir cake made from brown sugar, honey, stevia sugar, and corn sugar. Initially, stevia sugar is used to generate a hard texture since it substitutes the sucrose that softens the cake (Kusumadewi & Septiyani, 2021).

IV. Conclusion

In the end, this study concludes: 1) the respondents prefer khamir cake made from brown sugar so that it can replace khamir cake made from granulated sugar, 2) the results of the Kendall test showed significantly different results from each khamir cake formulation, as shown from the obtained sig = P < 0.005. There is a significant correlation between the different types of sweeteners on the respondent preferences on the attributes of aroma, color, flavor, and texture of khamir cake. 3) The results of the

Wilcoxon test showed a significantly different color of khamir cake made from honey compared to other khamir cakes. Meanwhile, the different attributes of aroma, taste, and texture were found in the khamir cake made from honey, stevia sugar, and corn sugar. 5) Khamir cake made from brown sugar had the most similar color, aroma, flavor, and texture to the khamir cake from granulated sugar.

This research used a respondent preference test to identify the types of sweetener substitutes that can replace the granulated sugar that offers low calories. Future studies are suggested using the chemical test to measure the sugar level on each sweetener substitute for the preparation of khamir cake. Besides, this khamir cake can also be potentially used by small businesses for healthy catering.

References

Adrial, R. (2018). Fuzzy logic modeling metode sugeno pada penentuan tipe diabetes melitus menggunakan MATLAB. *Jurnal Ilmiah Informatika*, *6*(01), 62–68.

Aina, Q., Ferdiana, S., & Rahayu, F. C. (2019). Penggunaan daun stevia sebagai pemanis dalam pembuatan sirup empon-empon. *Journal of Scientech Research and Development*, *1*(1), 1–11.

Aprilia, F. (2022). *Eksperimen pembuatan cake subtitusi tepung tempe*. STP AMPTA Yogyakarta.

Ayuwardani, N. (2018). Pengaruh pola makan terhadap kadar malondialdehid plasma sebagai upaya pencegahan diabetes mellitus di usia remaja. *Jurnal Keperawatan*, *11*(2), 27–32.

Darmawan, B. (2016). *Pengaruh penambahan tape singkong terhadap beberapa karakteristik kue kamir (Tinjauan Pustaka)*.

Djajasentana, B. A., & Samboh, R. D. (2020). Uji kesukaan penambahan madu sebagai olesan kue kering. *Culinaria*, *2*(2), 1–18.

Fadlilah, S., Sucipto, A., & Amestiasih, T. (2019). Usia, jenis kelamin, perilaku merokok, dan IMT berhubungan dengan resiko penyakit kardiovaskuler. *Jurnal Keperawatan*, *11*(4), 261–268.

Jasri, J., & Nazli, R. (2018). Penerapan metode mamdani untuk sistem pendukung keputusan penentuan golongan obat sesuai dengan penyakit diabetes. *Jurnal Teknologi dan Open Source*, *1*(2), 67–74.

Jumriani, J., Pasigai, M. A., & Hidayat, M. (2019). Analisis implementasi quality control pada produksi gula PT. Perkebunan Nusantara XIV (Persero) Pabrik Gula Takalar Kabupate Takalar. *Jurnal Profitability Fakultas Ekonomi dan Bisnis*, *3*(1), 1–9.

Kusumadewi, K., & Septiyani, P. (2021). *Aplikasi stevia pada produk cookies, biskuit dan muffin.*

Laga, A., Langkong, J., & Muhpidah, M. (2019). Pengaruh penggunaan jenis gula terhadap mutu kurma tomat:(The effect of different sugar type on the quality of tomato date). *Canrea Journal: Food Technology, Nutritions, and Culinary Journal*, *2*(1), 62–68.

Lutfi, E. I. (2019). Perubahan osmolaritas pasien hiperglikemia dengan terapi rehidrasi. *Holistic Nursing and Health Science*, *2*(1), 39–44.

Nasriyah, N., Cholifah, N., & Qasanah, I. (2022). Hubungan antara pola konsumsi makanan sebelum tidur dan tingkat kecemasan pada lansia dengan kejadian insomnia di Desa Temulus Kecamatan Mejobo Kabupaten Kudus. *Indonesia Jurnal Kebidanan*, *4*(2), 19–24.

Ningtias, N. (2017). *Jajanan khas Kampung Arab "Kamir" sebagai bentuk akulturasi Budaya Jawa dan Arab di Pemalang.* Universitas Negeri Semarang.

Purnamasari, D. Y. (2022). *Optimalisasi formulasi gula kristal putih, stevia, dan sukralosa sebagai pemanis terhadap karakteristik bolu pisang dengan menggunakan design expert metode mixture d-optimal*. Fakultas Teknik Unpas.

Rehena, Z., & Ivakdalam, L. M. (2019). Pengaruh substitusi rumput laut terhadap kandungan serat cookies sagu. *Agrikan: Jurnal Agribisnis Perikanan*, *12*(1), 157–161.

Rosiana, N. M., & Khoiriyah, T. (2018). Yogurt tinggi antioksidan dan rendah gula dari sari buah apel rome beauty dan madu. *Jurnal Ilmu dan Teknologi Hasil Ternak (JITEK)*, *13*(2), 81–90.

Saptarina, S. (2017). *Pengaruh variasi konsentrasi gula jawa terhadap ketebalan, warna, aroma, tekstur dan rasa nata de tomato*. Universitas Sanata Dharma.

Seko, M. H., Sabuna, A. C., & Ngginak, J. (2021). Ekstrak etanol daun ajeran sebagai antibakterian terhadap Staphylococcus Aureus. *Jurnal Biosains*, *7*(1), 1–9.

Taluke, D., Lakat, R. S. M., & Sembel, A. (2019). Analisis preferensi masyarakat dalam pengelolaan ekosistem mangrove di pesisir pantai kecamatan loloda kabupaten halmahera barat. *Spasial*, *6*(2), 531–540.

Triachdiani, N., & Murtini, E. S. (2021). Pengaruh varietas kacang tanah (Arachis Hypogaea l.) dan rasio gula aren: Gula pasir terhadap karakteristik enting-enting geti. *Jurnal Pangan dan Agroindustri*, *9*(2), 100–110.

Utomo, R. S., & Wahyudi, T. (2017). Kelayakan finansial gua jagung sebagai bioindustri di Kabupaten Bengkayang. *Jurnal Penelitian dan Pengembangan Borneo Akcaya*, *4*(1), 1–15.

Yulia, M., Azra, F. P., & Ranova, R. (2022). Formulasi hard candy dari sari buah jeruk nipis (citrus aurantifolio), madu (mell depuratum) dan kayu manis (cinnamomum burmanii) berdasarkan perbedaan sirup glukosa. *Jurnal Riset Kefarmasian Indonesia*, *4*(1), 89–100.

Zafira, F., & Kamal, R. (2017). Perbedaan karakteristik organoleptik dan daya terima konsumen pada kue seupet dengan penambahan sari pati wortel. *Jurnal Ilmiah Mahasiswa Pendidikan Kesejahteraan Keluarga*, *2*(3), 28–44.

Zulaikha, F., Sureskiarti, E., & Herlina, N. (2020). Pelatihan cara pembuatan makanan ringan rendah gula bagi penderita diabetes mellitus. *Panrita Abdi-Jurnal Pengabdian pada Masyarakat*, *4*(1), 77–82.