Pumpchees Bar Development (Pumpkin Seeds and Chia Seeds) as an Alternative High-Fiber Snack

Dhana Alvia Noor(✉), Septa Katmawanti, Agung Kurniawan, and Supriyadi

Universitas Negeri Malang, Malang, Indonesia
Septakatma.fik@um.ac.id

Abstract. The transition in dietary habits toward low-fiber fast food may be a risk factor for obesity and metabolic syndrome. Fiber has several advantages, one of which is that it can provide a long feeling of fullness. Pumpkin seeds and chia seeds are examples of high-fiber foods. The goal of this study was to conduct organoleptic tests and proximate analysis on a pumpchees bar with pumpkin seeds and chia seeds substituted as an alternative high-fiber snack. Methods of research and development are used in this study. There are three formulations: F1 (95:5), F2 (90:10), and F3 (85:15). The organoleptic test results revealed that the highest pumpchees bar taste was F1 a value of 4, the texture of the pumpchees bar was F1 a value of 3,67, the color of the pumpchees bar was F3 a value of 3.67, and the aroma of the pumpchees bar was F1 a value of 3,67. According to the pumpchees bar proximate analysis, the highest water level was F1 (11,87%), the highest ash level was F1 (7,56%) F3 had the highest fat level (10,75%), and F3 had the highest protein content (14,66%). F1 had the highest carbohydrate level (60,69%), and F3 had the highest fiber level (13,71%). The best organoleptic test results were the formulation with a ratio of pumpkin seeds and chia seeds as much as 95:5 and the best proximate analysis was the formulation with a ratio of pumpkin seeds and chia seeds as much as 85:15.

Keywords: Pumpkin Seeds · Chia Seeds · Fiber

1 Introduction

Dietary habits are one of the nutritional issues that are currently being addressed. This dietary change may put people at risk for diseases like obesity. According to Riskesdas data from 2013, the proportion of overweight adults aged > 18 years was 10.9%, which increased to 13.75% in 2018. Obesity was 8.4% in 2013, and it has risen to 22.37% in 2018 [1, 2]. This rise in obesity may result in metabolic syndrome (SM). A metabolic syndrome is a group of metabolic disorders that includes central obesity, elevated triglyceride and glucose levels, hypertension, and low high-density lipoprotein (HDL) levels [3–5]. This metabolic syndrome has been linked to an increase in the occurrence of type 2 diabetes and cardiovascular disease [6].

Y. N. Hanief et al. (Eds.): ICSSH 2022, 54, pp. 269–281, 2022.
https://doi.org/10.2991/978-94-6463-072-5_27

In accordance with this, it is critical to prevent obesity in order to avoid metabolic syndrome, which increases the risk of other diseases. This disease or health issue can affect anyone, including teenagers and adults [7]. Prevention can be accomplished by eating a well-balanced diet of nutritious foods and avoiding fast food for easily accessible reasons [8, 9]. If food intake is unbalanced, the body will lack energy, causing immune cells to weaken and affecting the body's work functions [10–12]. According to previous research, as many as 80% of Indonesians consume 15 g of fiber per person per day, while the RDA recommendation for daily fiber consumption is 25 g [13]. A lack of fiber can cause a person to eat continuously, resulting in excess weight [14].

Fiber serves numerous functions in the body. Fiber stimulates saliva and increases food volume in the mouth. Soluble fiber delays the emptying of gastric contents in the stomach. Soluble fiber forms a thick solution in the small intestine, inhibiting carbohydrate and fat absorption and thus slowing glucose absorption. Fiber, in general, regulates the intestines, prevents constipation, controls blood cholesterol, regulates blood sugar levels, and helps to prevent obesity [15]. Fiber can be found in vegetables, fruits, and whole grains, as well as pumpkin seeds and chia seeds.

Pumpkin seeds and chia seeds are two examples of high-fiber foods. Pumpkin seeds and chia seeds have a diverse nutritional content. Pumpkin seeds contain 18.6 g of protein, 19.4 g of total fat, 53.8 g of carbohydrates, 18.4 g of fiber, and phenolic compounds that can scavenge free radicals, lowering the risk of several degenerative diseases [16–19]. Chia seeds also have a high nutritional content per 100 g, with 42.1 g of carbohydrates, 30.7 g of total fat, 16.5 g of protein, and 34.4 g of fiber [20–24].

Pumpkin seeds (Cucurbita Moschata) and chia seeds (Salvia Hispanica L) are two of the few that are used as processed food ingredients for daily consumption. Previous research has used pumpkin as a snack bar product, but no research has used pumpkin seeds as a primary ingredient in snack bars [25–27]. As a result, in order to increase the utilization of pumpkin seeds and chia seeds, researchers intend to create a snack bar product containing pumpkin seeds and chia seeds. This snack bar is known as "PUMPCHEES BAR." Pumpchees bars are suitable for consumption by the general public, particularly adults seeking high-fiber snacks.

The purpose of this study is to conduct organoleptic tests and proximate analysis on a pumpchees bar with pumpkin seeds and chia seeds as an alternative high-fiber snack. The goal of this study is to conduct organoleptic tests and analyze chemical characteristics of a pumpchees bar with pumpkin seeds and chia seeds substitution.

2 Method

The method used in this study is research and development, which is research used to create specific products and test their effectiveness. Each manufactured product has unique specifications [28].

2.1 Research and Development Procedure

The following are the research and development procedures used in this study.

2.1.1 Create Research Documents

At this point, the researcher obtained three permits from Universitas Negeri Malang's Faculty of Sports Science. The first permit for the process of making pumpchees bars and organoleptic testing at Universitas Negeri Malang's Nutrition Laboratory of the Faculty of Sports Science. The second permission letter to conduct an ethical test at Universitas Airlangga's Faculty of Dentistry. This study's code of ethics registration number is 126/HRECC.FODM/III/2022. Third proximate analysis license at the Jember State Polytechnic Food Analysis Laboratory.

2.1.2 Formulating Pumpchees Bar

The researcher created three (3) pumpchees bar formulations (F1, F2, and F3) for organoleptic and proximate analysis testing. The percentages of pumpkin seeds and chia seeds used in the three formulations to be tested were F1 (95:5), F2 (90:10), and F3 (85:15). The pumpkin seeds used to make flour are processed in several stages, including selecting the pumpkin seeds, washing, drying, grinding, and sifting the smooth pumpkin seeds. Then, in a mixing bowl, combine the eggs, sugar, and margarine with a mixer. Once well combined, add pumpkin seed flour, chia seeds, and milk and mix until smooth. Pumpchees bar dough is molded and placed on a baking sheet after it has been thoroughly mixed. Then bake until half done, then add the raisins and the pumpchees bar and bake until done.

2.1.3 Conduct an Organoleptic Test

An organoleptic test was performed in this study, which included a taste test, texture test, color test, and aroma test. Panelists are used in the organoleptic test to determine the level of preference. Panels are classified into seven types: individual panels, limited panels, trained panels, moderately trained panels, untrained panels, consumer panels, and children's panels. The application of these panels varies depending on the purpose of the test [29]. This study relied on a limited panel of three people. The limited panel consists of panelists who are highly sensitive to the product (pumpchees bar), allowing bias to be avoided. An organoleptic test with limited panels was conducted at the Nutrition Laboratory of the Faculty of Sports Science, Universitas Negeri Malang.

2.1.4 Proximate Analysis

Pumpchees bar was reformulated based on the results of organoleptic tests to achieve the best formulation. After revising the pumpchees bar, it was analyzed at the Jember State Polytechnic Food Analysis Laboratory using proximate analysis, which included water content analysis, ash content analysis, carbohydrate content analysis, protein content analysis, fat content analysis, and fiber content analysis.

2.2 Research Subject

Pumpchees bar production and organoleptic testing took place in March 2022 at the Nutrition Laboratory of the Faculty of Sports Science, Universitas Negeri Malang. This

Table 1. Hedonic scale and numeric scale.

No	Hedonic Scale	Numeric Scale
1	Like extremely	5
2	Like moderately	4
3	Like slightly	3
4	Dislike moderately	2
5	Dislike extremely	1

organoleptic test included only three panelists. Following the organoleptic test, proximate analysis was performed at the Jember State Polytechnic Food Analysis Laboratory in April-May 2022.

2.3 Data Type

This study yielded both qualitative and quantitative data. Qualitative data derived from organoleptic test results. This qualitative data is converted to a numerical scale so that statistical calculation techniques can be used to analyze it. In terms of quantitative data derived from proximate analysis results.

2.4 Data Collection Instrument

A questionnaire with a hedonic scale on the organoleptic test and the proximate analysis results on the proximate analysis was used to collect data. The hedonic test, also known as the preference test, uses a hedonic scale of dislike extremely, dislike moderately, like slightly, like moderately, and like extremely. The hedonic scale is converted into a numerical scale based on the level of preference so that it can be statistically analyzed [30] (Table 1).

3 Result and Discussion

3.1 Result

3.1.1 Pumpchees Bar Organoleptic Characteristics

Taste Figure 1 depicts the outcome of a trained panelist's evaluation of the pumpchees bar's taste parameters. The pumpchees bar taste parameter has an average rating of 3–4. Pumpchees bar F1 has the highest average value of 4, with a pumpkin seed flour to chia seed ratio of 95:5. F3, which is 3 and has a ratio of up to 85:15 between pumpkin seed flour and chia seeds, has the lowest average value.

Texture The pumpchees bar assessment on texture parameters yielded an average of 2.67–3.67. Pumpchees bar F1 has the highest average value of 3.67, with a pumpkin seed to chia seed ratio of 95:5. Pumpchees bar F3 has the lowest average value of 2.67, with a pumpkin seed to chia seed ratio of 85:15 (Fig. 2).

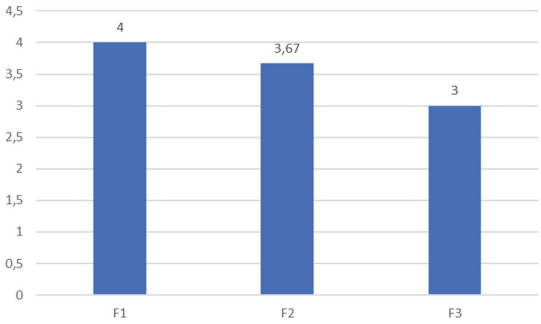

Fig. 1. Taste parameter organoleptic test.

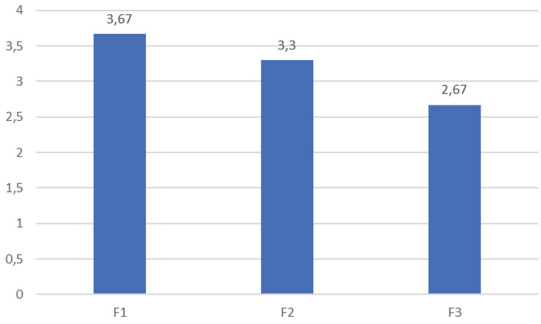

Fig. 2. Texture parameter organoleptic test.

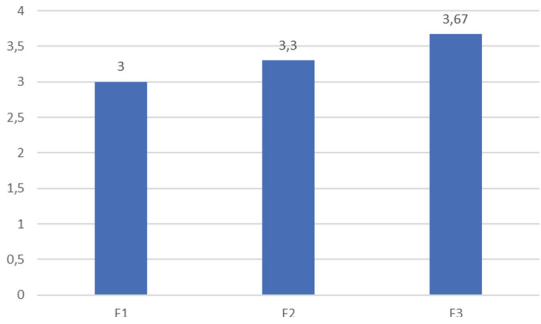

Fig. 3. Color parameter organoleptic test.

Color The pumpchees bar has an average value of 3–3.67 in the color parameter. Pumpchees bar F3 has the highest average value of 3.67, with a pumpkin seed to chia seed ratio of 85:15. While the pumpchees bar F1 has the lowest value of 3 when compared to pumpkin seeds and chia seeds, the ratio is as high as 95:5 (Fig. 3)

Aroma The aroma parameters on the pumpchees bar were evaluated and the results were not far off. The pumpchees bar F1 received the highest rating, with a pumpkin seed to

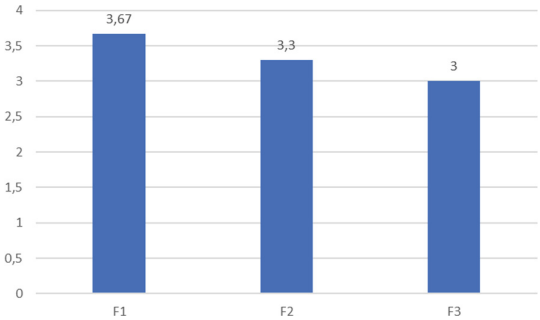

Fig. 4. Aroma parameter organoleptic test.

Table 2. Water level.

Formulation	Test Results
F1	11.87 ± 0.028
F2	11.82 ± 0.042
F3	11.74 ± 0.028

Table 3. Ash level.

Formulation	Test Results
F1	7.56 ± 0.085
F2	7.43 ± 0.042
F3	7.24 ± 0.057

chia seed ratio as high as 95:5. Meanwhile, the pumpchees bar F3 has the lowest rating, with a pumpkin seed-to-chia seed ratio of 85:15 (Fig. 4).

3.1.2 Pumpchees Bar Nutritional Value

Water Level The analysis of the water level on the pumpchees bar shows that F1 is 11,87%, F2 is 11,82%, and F3 is 11,74%. Pumpchees bar F1 has the highest water level, with a pumpkin seed to chia seed ratio of 95:5. While the pumpchees bar F3 with an 85:15 ratio of pumpkin seeds and chia seeds had the lowest water level (Table 2).

Ash Level The analysis of pumpchees ash level yielded three results: F1 of 7.56%, F2 of 7.43%, and F3 of 7.24%. The analysis of the highest ash level found in F1 with a ratio of pumpkin seeds and chia seeds as high as 95:5. While the pumpchees bar F3 with an 85:15 ratio of pumpkin seeds and chia seeds has the lowest ash level of the pumpchees bar (Table 3).

Table 4. Fat level.

Formulation	Test Results
F1	8.24 ± 0.057
F2	9.02 ± 0.693
F3	10.75 ± 0.071

Table 5. Protein level.

Formulation	Test Results
F1	11.64 ± 0.042
F2	14.19 ± 0.127
F3	14.66 ± 0.085

Table 6. Carbohydrate level.

Formulation	Test Results
F1	60.69 ± 0.212
F2	57.04 ± 0.127
F3	55.59 ± 0.099

Fat Level Analysis of the fat level on the pumpchees bar yielded three results from each formulation. The pumpchees bar analysis yielded results of 8.24% F1, 9.02% F2, and 10.75% F3. The highest fat analysis on the pumpchees bar yielded F3 with a fat level of 10.75% and an 85:15 ratio of pumpkin seeds to chia seeds. The analysis of the lowest fat level found the pumpchees bar F1 with a fat level of 8.24% and a ratio of pumpkin seeds to chia seeds of 95:5 (Table 4).

Protein Level Protein levels in the pumpchees bar F1, F2, F3 were 11.64%, 14.19%, and 14.66%, respectively The pumpchees bar F3 formulation had the highest protein level, with an 85:5 ratio of pumpkin seeds to chia seeds, while the pumpchees bar F1 formulation had the lowest protein level, with a 95:5 ratio of pumpkin seeds to chia seeds (Table 5).

Carbohydrates Level According to Table 6, the results of the analysis of pumpchees bar carbohydrates F1 were 60.69%, F2 were 57.04%, and F3 were 55.59%. The highest analysis results were found in pumpchees bar F1, which contained pumpkin seeds and chia seeds in a 95:5 ratio, and the lowest analysis results were found in pumpchees bar F3, which contained pumpkin seeds and chia seeds in a ratio of 85:15 (Table 6).

Table 7. Fiber level.

Formulation	Test Results
F1	10.92 ± 0.057
F2	11.67 ± 0.028
F3	13.71 ± 0.057

Fiber Level Table 7 displays the fiber level analysis results of three pumpchees bar formulations (F1, F2 and F3). Pumpchees bar F1 contains 10.92% fiber, Pumpchees bar F2 contains 11.67% fiber, and Pumpchees bar F3 contains 13.71% fiber. The highest fiber content of pumpchees bar is found in F3 with a pumpkin seed to chia seed ratio of 85:15, while the lowest fiber content of pumpchees bar is found in F1 with a pumpkin seed to chia seed ratio of 95:5.

3.2 Disscussion

3.2.1 Pumpchees Bar Physical Characteristics

According to the findings of the research, the results are as previously stated. This study utilized an organoleptic test with four parameters: taste, texture, color, and aroma. The taste obtained in taste parameters is determined by the composition used in the manufacture of a product. The addition of pumpkin seeds imparts a slight bitter aftertaste. However, the processing process, particularly the prolonged washing of pumpkin seeds, can reduce the bitter taste caused by phytic acid in pumpkin seeds [31]. As a result, increasing the percentage of pumpkin seeds can improve taste acceptance. The pumpchees bar F1 formulation received the highest score, while the pumpchees bar F3 formulation received the lowest.

A product's texture is determined by the composition and type of raw materials used. The moisture content of the product can also have an impact on its texture. Low water levels increase product hardness, while high water levels decrease product hardness [32]. The water level in the pumpchees bar F3 formulation is lower than in the F1 pumpchees bar formulation. As a result, the texture in the F1 pumpchees bar formulation is valued higher than the texture in the F3 pumpchees bar formulation.

Color is important to consider because it can influence the level of acceptance of a product. If a product has a high nutritional value but an unappealing color, the product may be less appealing [33, 34]. The influence of protein mixed with sugar in hot temperatures causes green pumpkin seed flour to darken [35]. The darker the pumpchees bar, the more pumpkin seed flour it contains. The pumpchees bar F3 formulation contains the least amount of pumpkin seed flour, resulting in a color that is not too dark and has the highest average color value.

The aroma of a product can determine its delicacy; products with distinct aromas are more likely to be preferred [36]. A pumpchees bar with a high percentage of pumpkin seeds may have a more distinct aroma than a pumpchees bar with a low percentage of pumpkin seeds. As a result, the pumpchees bar F1 formulation receives the highest aroma assessment scores.

Panelists limited to organoleptic tests also provided some criticisms and suggestions that were used to revise the product prior to proximate analysis. Some of the changes were to bake the pumpchees bar in one pan to avoid varying ripeness, to print the pumpchees bar with a mold to get the same size pumchees bar pieces, and to evenly distribute the raisin mixture to each piece of pumpchees bar.

Food products that contain pumpkin seed flour may be more appealing to consumers. Tri Ardiati Khasanah and Christina Erawati Mumpuni conducted research titled "Pengaruh Formulasi Tepung Haruan, Tepung Buah dan Biji Labu Kuning pada Biskuit terhadap Kandungan Gizi dan Daya Terima". The study's findings concluded that increasing the proportion of pumpkin seed flour proved to increase acceptability (taste, texture, color, and aroma) [36].

Food products containing chia seeds can improve product acceptability. This claim is supported by a study titled "Effect of Soy Concentrate, Oat (Avena sativa) Flour and Chia Seeds (Salvia hispanica) as a Partial Substitute of Wheat Flour (Triticum aestivum) on Protein Content, Dietary Fiber Content, Textural Shelf Life and Organoleptic Properties of Breadsticks" by Mariel Angelica Reyes Rendon, Esther Perez Carrillo dan Sara Guajardo Flores. According to the study's findings, the addition of chia seeds can boost acceptance and make it a favorite in the preference test [37].

According to the results of the organoleptic tests, the pumpchees bar F1 formulation has a higher level of acceptance than the other pumpchees bar formulations. This is supported by the organoleptic test results for taste parameters with a score of 4, texture with a score of 3.67, color with a score of 3, and aroma with a score of 3.67.

3.2.2 Pumpchees Bar Chemical Characteristics

The pumpchees bar has the following chemical composition: water level, ash level, fat level, protein level, carbohydrate level, and fiber level. The moisture level in the dough can have an impact on the final product's quality. Moisture content can also affect product stability and durability. Due to the difficulty in removing the water from pumpkin seed flour during drying, fewer free water molecules are evaporated. The high fiber level of chia seeds influences the water level of the product. This is due to the fiber's high ability to bind water [32]. Because pumpkin seed content is more dominant in the pumpchees bar formulation than chia seed content, the water level in chia seeds has no significant effect. Pumpchees bar F1 formulation contains the most pumpkin seed flour, resulting in a high water level. Because the pumpchees bar F3 formulation contains little pumpkin seed flour, it has a low water level [38].

The ash level is a parameter that indicates the amount of inorganic (mineral) content in a product. Calcium, phosphorus, magnesium, potassium, iron, and other minerals can be found in a product. The higher the ash level, the more minerals it contains. Similarly, the lower the ash level, the lower the mineral content [25]. A high ash level can reduce dough resistance to swelling. Because the mineral content of pumpkin seeds is higher than that of chia seeds in the pumpchees bar formulation, the pumpchees bar F1 formulation has the highest ash level and the pumpchees bar F3 formulation has the lowest ash level [38].

Fat is obtained from a variety of food sources and is required by the body to maintain health. When compared to carbohydrates and protein, fat is a more efficient energy

source [39]. Chia seeds have a higher fat level than pumpkin seeds [38]. As a result, the fat content of the pumpchees bar is highest in the pumpchees bar formulation with the highest percentage of chia seeds, namely the F3 pumpchees bar formulation.

Protein aids in the formation of biomolecules, allowing it to be used as an energy source [40]. Pumpkin seeds contain nearly all essential amino acids, indicating that they contain high-quality protein [41]. Pumpkin seeds have a higher protein level than chia seeds. However, according to the findings of the pumpchees bar analysis, the percentage of pumpchees bars with a high level of pumpkin seeds has a low yield, whereas the percentage of pumpkin seeds with a low protein level has a high yield. This can be caused by the roasting and oven processing of pumpkin seeds, which reduces the protein level in pumpkin seeds. Meanwhile, chia seeds are only baked, not roasted, so their protein content remains high [40].

Carbohydrates are the body's primary source of calories and are abundant in plant foods such as tubers and seeds [42]. According to the results of a proximate analysis performed on pumpchees bars, the carbohydrate level of pumpkin seeds is higher than the carbohydrate level of chia seeds [38]. As a result, the carbohydrate content of the pumpchees bar formulation with the highest percentage of pumpkin seeds, namely the F1 pumpchees bar formulation, has the highest value.

Each food ingredient has a different amount of fiber, so measurements are required to determine the quality of a food ingredient [32]. Chia seeds have a higher fiber level than pumpkin seeds. As a result, the higher the chia seed concentration, the higher the fiber level [38]. According to the results of the proximate analysis, the pumpchees bar F3 formulation with the most chia seeds had the highest fiber level at 13.71%. While the pumpchees bar F1 formulation contains a low amount of chia seeds, the fiber level is also low at 10.92%.

Foods containing pumpkin seed flour can increase the fiber level of the product. Alinda Rahmani, Supriyadi, and Septa Katmawanti conducted research titled "Pengaruh Substitusi Tepung Biji Labu Kuning (Cucurbita moschata) terhadap Karakteristik Kimia Produk Boba (Bubble Pearl) sebagai Alternatif Topping Minuman Tinggi Protein dan Serat" The study's findings concluded that differences in the administration of pumpkin seed flour affected the product's fiber content. The more pumpkin seed flour substituted, the higher the fiber level [43].

Foods containing chia seeds can increase the fiber content of the product. Mirjana Demin, Biljana Rabrenovi, Lato Pezo, and Jovanka Lalii-Petronijevi conducted research titled "Influence of Chia Seeds (Salvia hispanica L.) and Extra Virgin Oil Addition on Nutritional Properties of Salty Crackers" oleh Mirjana Demin, Biljana Rabrenović, Lato Pezo dan Jovanka Laličić-Petronijević. The study concluded that the addition of chia seeds increased fiber levels [44].

According to the results of the proximate analysis, the pumpchees bar F3 formulation had the highest nutritional value, with a water level of 11.74%, an ash level of 7.24%, a fat level of 10.75%, a protein level of 14.66%, and a protein level of 14.66%. Carbohydrate content is 55.59% and fiber content is 13.71%.

4 Conclusion

According to the results of organoleptic tests, the best pumpchees bar formulation was the one with a 95:5 ratio of pumpkin seeds to chia seeds. The best pumpchees bar formulation was obtained in the proximate analysis, namely the formulation with an 85:15 ratio of pumpkin seeds to chia seeds. The more chia seeds added to the pumpchees bar, the higher the fiber level. However, because the fat level of the pumpchees bar is relatively high, additional research to provide treatments that can reduce fat levels and develop other food variations with the basic ingredients of pumpkin seeds and chia seeds is recommended.

References

1. Kementerian Kesehatan RI, "Hasil Utama RISKESDAS 2013," 2013.
2. Kementerian Kesehatan RI, "Hasil Utama RISKESDAS 2018," 2018.
3. R. Listyandini, F. D. Pertiwi, and D. P. Riana, "Asupan Makan, Stress, dan Aktivitas Fisik dengan Sindrom Metabolik pada Pekerja di Jakarta," 2020.
4. Muhammad Dziky and Dienny Fillah Fithra, "Hubungan Asupan Vitamin A, C, dan E dengan Kejadian Sindrom Metabolik pada Remaja Obesitas," Journal of Nutrition College, vol. 5, no. 4, pp. 289–297, 2016.
5. Wati Popy Mega and Ernawati, "Hubungan Status Gizi dengan Kejadian Sindrom Metabolik di Sabuh Kecamatan Arosbaya Kabupaten Bangkalan-Madura," *Jurnal "Ilmiah Kedokteran,"* vol. 5, no. 1, pp. 37–48, 2016.
6. A. N. Djausal, "Effect of Central Obesity as Risk Factor of Metabolic Syndrome," 2015.
7. R. Chaterina Dwi Cahyaning Supriyadi Agung Kurniawan, "Hubungan Pola Konsumsi, Aktivitas Fisik dan Jumlah Uang Saku dengan Status Gizi pada Siswa SMP Negeri di Kota Malang Tahun 2019." (Online). Available: http://journal2.um.ac.id/index.php/jfik/indexhttp://fik.um.ac.id/
8. S. Katmawanti, Supriyadi, and I. Setyorini, "Hubungan Pola Makan dan Aktivitas Fisik dengan Status Gizi Siswi Kelas VII SMP Negeri (Full Day School)."
9. S. Katmawanti and N. H. Ulfah, "Analisis Faktor yang Mempengaruhi Pola Konsumsi Mi Instant pada Mahasiswa di Universitas Negeri Malang," 2016.
10. E. Fitriningtyas, S. Redjeki, and A. Kurniawan, "Usia Menarche, Status Gizi, dan Siklus Menstruasi Santri Putri."
11. A. Santoso, M. Devi, and A. Kurniawan, "Peningkatan Pengetahuan Siswa Mengenai Jajanan Sehat Menggunakan Media Minicard."
12. A. Wiranata, H. E. Wardani, and S. Katmawanti, "Gambaran Status Gizi Siswa Kelas VII di Sekolah Menengah Pertama Negeri," *Jurnal Sport Science and Health*, vol. 2, no. 1, pp. 67–77, 2020.
13. R. Y. Makaryani, "Hubungan Konsumsi Serat dengan Kejadian Overweight pada Remaja Putri SMA Batik1 Surakarta," 2013.
14. A. H. al Rahmad, "Asupan Serat dan Makanan Jajanan sebagai Faktor Resiko Obesitas pada Anak di Kota Banda Aceh," vol. 1, no. 2, pp. 1–8, 2018.
15. E. J. Astuti, "Serat Pangan dalam Produk Pangan Fungsional," 2017.
16. J. M. Dotto and J. S. Chacha, "The Potential of Pumpkin Seeds as a Functional Food Ingredient : A Review," *Sci Afr*, vol. 10, p. e00575, 2020.
17. M. F. Dowidar, A. I. Ahmed, and H. R. Mohamed, "The Critical Nutraceutical Role of Pumpkin Seeds in Human and Animal Health: An Update Review," vol. 48, no. 2, pp. 199–212, 2020.

18. S. Mujaffar and S. Ramsumair, "Fluidized Bed Drying of Pumpkin (Cucurbita sp.) Seeds," pp. 10–12, 2019.
19. USDA, "Food Data Central," 2019. https://fdc.nal.usda.gov/fdc-app.html#/food-details/169655/nutrients (accessed Jul. 19, 2022).
20. I. Arumsari and M. Sofyaningsih, "Evaluasi Zat Gizi Tepung Chia (Salvia hispanica L.) dan Tepung Wijen (Sesamum indicum L) sebagai Alternatif Tepung Tinggi Serat dan Protein," vol. 5, no. 1, pp. 27–33, 2020.
21. M. K. Hrnčič, M. Ivanovski, D. Cör, and Ž. Knez, "Chia Seeds (Salvia Hispanica L.): An overview-phytochemical profile, isolation methods, and application," *Molecules*, vol. 25, no. 1. 2020.
22. S. L. F. Meyer *et al.*, "Chia: Host Status for Meloidogyne incognita and Activity of Plant Extracts," no. November, pp. 2979–2985, 2020.
23. E. A. Otondi, J. M. Nduko, and M. Omwamba, "Physico-chemical Properties of Extruded Cassava-Chia Seed Instant Flour," *J Agric Food Res*, vol. 2, no. May, p. 100058, 2020.
24. Rasbawati and Irmayani, "Pemanfaatan Biji Chia (Salvia hispanica L.) untuk Meningkatkan Kualitas Susu Diversifikasi," *Jurnal Peternakan Indonesia*, vol. 23, no. 2, pp. 159–167, 2021, doi: https://doi.org/10.25077/jpi.23.2.159-167.2021.
25. Hastuti Afiyah Ratna and Afifah Diana Nur, "Analisis Aktivitas Antioksidan, Analisis Kandungan Gizi, Uji Organoleptik Snack Bar Sesame Seed dan Tepung Labu Kuning sebagai Alternatif Makanan Selingan dengan Tinggi Antioksidan," *Journal of Nutrition College*, vol. 8, no. 4, pp. 219–230, 2019
26. T. C. Singgano, T. Koapha, and C. F. Mamuaja, "Analisis Sifat Kimia dan Uji Organoleptik Snack Bar Berbahan dari Campuran Tepung Labu Kuning (Cucurbita moschata) dan Tepung Kacang Hijau (Vigna radiata)," 2019.
27. Winiastri Dinda, "Formulasi Snack Bar Tepung Sorgum (Sorghum bicolor (L.) moench) dan Labu Kuning (Cucurbita moschata) Ditinjau dari Uji Organoleptik dan Uji Aktivitas Oksidan," *Jurnal Inovasi Penelitian*, vol. 2, no. 2, pp. 751–764, 2021.
28. S. Budiwanto, "Metodologi Penelitoan dalam Keolahragaan," *Malang Pres*, 2017.
29. Permadi Rizal M, H. Oktafa, and K. Agustianto, "Perancangan Sistem Uji Sensoris Makanan dengan Pengujian Peference Test (Hedonik dan Mutu Hedonik), Studi Kasus Roti tawar, Menggunakan Algoritma Radial Basis Function Network," *Jurnal Mikrotik*, vol. 8, no. 1, 2018.
30. UNIMUS, "Pengujian Organoleptik," *Universitas Muhammadiyah Semarang*, p. 31, 2013.
31. F. Karunia, Soemardini, and Y. Rahmi, "Peningkatan Kadar Makronutrien, Zink dan Mutu Organoleptik pada Susu Nabati Biji Labu Kuning (Cucurbita moschata Durch.) melalui Proses Perendaman," 2017.
32. R. Rismaya, E. Syamsir, and B. Nurtama, "Pengaruh Penambahan Tepung Labu Kuning Terhadap Serat Pangan, Karakteristik Fisikokimia dan Sensori Muffin," *Jurnal Teknologi dan Industri Pangan*, vol. 29, no. 1, pp. 58–68, Jun. 2018.
33. J. K. Negara *et al.*, "Aspek mikrobiologis, serta Sensori (Rasa, Warna,Tekstur, Aroma) Pada Dua Bentuk Penyajian Keju yang Berbeda," *Jurnal Ilmu Produksi dan Teknologi Hasil Peternakan*, vol. 4, no. 2, pp. 286–290, 2016.
34. F. Paramita, S. Katmawanti, A. Kurniawan, N. Komariyah, M. Sabrina, and D. Aflah, "Analisis Sensori Smoothies dengan Penambahan Chia Seeds sebagai Pangan Tinggi Serat," 2020.
35. Diniyati Bintang, "Kadar Betakaroten, Protein, Tingkat Kekerasan, dan Mutu Organoleptik Mie Instan dengan Substitusi Tepung Ubi Jalar Merah (Ipomoea batatas) dan Kacang Hijau (Vigna radiata)," 2012.
36. C. E. Mumpuni and T. A. Khasanah, "Pengaruh Formulasi Tepung Ikan Haruan, Tepung Buah dan Biji Labu Kuning pada Biskuit terhadap Kandungan Gizi dan Daya Terima," *Journal of Nutrition College*, vol. 10, no. 1, pp. 1–9, 2021.

37. M. A. R. Rendón, E. P. Carrillo, and S. G. Flores, "Effect of Soy Concentrate, Oat (Avena sativa) Flour and Chia Seeds (Salvia hispanica) as a Partial Substitute of Wheat Flour (Triticum aestivum) on Protein Content, Dietary Fiber Content, Textural Shelf Life and Organoleptic Properties of Breadsticks," *J Food Res*, vol. 8, no. 3, p. 77, Apr. 2019.
38. USDA, "Food Data Central," 2019. https://fdc.nal.usda.gov/fdc-app.html#/food-details/531546/nutrients (accessed Jul. 19, 2022).
39. Mardiah, T. Fitrilia, S. Widowati, and S. Fitri Andini, "Komposisi Proksimat pada Tiga Varietas Tepung Labu Kuning (Cucurbita Sp)," 2020.
40. Priyono Eko, Ninsix Retti, and Apriyanto Mulono, "Studi Pencampuran Labu Kuning (Cucurbita Moschata) dengan Tepung Beras terhadap Karakteristik Biskuit yang DIhasilkan," 2018.
41. S. Vinayashree and P. Vasu, "Biochemical, Nutritional and Functional Properties of Protein Isolate and Fractions from Pumpkin (Cucurbita Moschata Var. Kashi Harit) Seeds," *Food Chem*, vol. 340, Mar. 2021.
42. A. R. Thaha, Zainal, S. K. Hamid, D. S. Ramadhan, and Nasrul, "Analisis Proksimat dan Organoleptik Penggunaan Ikan Malaja sebagai Pembuatan Kerupuk Kemplang," *Media Kesehatan Masyarakat Indonesia*, vol. 14, no. 1, p. 78, Mar. 2018.
43. A. Rahmani, S. Supriyadi, and S. Katmawanti, "Peningkatan Nilai Protein dan Serat pada Pengembangan Boba Substitusi Biji Labu Kuning," *Sport Science and Health*, vol. 3, no. 9, pp. 675–682, Sep. 2021.
44. M. Demin, B. Rabrenović, L. Pezo, and J. Laličić-Petronijević, "Influence of Chia Seeds (Salvia hispanica L.) and Extra Virgin Olive Oil Addition on Nutritional Properties of Salty Crackers," *Journal of Food Measurement and Characterization*, vol. 14, no. 1, pp. 378–387, 2020.