Sensory Characteristics, Fiber Content, Potassium Jelly Drink from Watermelon Albedo (*Citrullus lanatus*) and Honey Pineapple (*Ananas comosus L*)

Nurjannah Nurjannah[1], Rosnah Rosnah*[2], Teguh Fathurrahman[3], Hariani Hariani[4], Anniken Rahmah Dewi[5], Lena Atoy[6], Dali Dali[7]

[1,6,7] Department of Nursing, Poltekkes Kemenkes Kendari, Kendari, Indonesia
[2,3,4,5] Department of Nutrition, Poltekkes Kemenkes Kendari, Kendari, Indonesia
basau.nurjannah@gmail.com[1], rosnahgunawan71@gmail.com[2], teguh.gizi3065@gmail.com[3], anigizi68@gmail.com[4], annikenrahmah@gmail.com[5], lena.atoy@gmail.com[6], dalimashar@gamil.com[7]

Abstract. Watermelon rind contains high levels of citrulline and arginine, which can help reduce high blood pressure. Honey pineapple has a sweeter taste than other types of pineapple, which can reduce blood pressure in hypertensive patients, partly due to its potassium content. Reduction of added sugars such as sucrose and increased consumption of whole fruits will lower blood pressure. In order to make jelly drinks, this study compares the sensory qualities, fiber content, and potassium content of watermelon rind with honey pineapple rind. This type of research is pre-experimental, three treatments are P1 = 500 g watermelon rind juice: 0% pineapple honey juice; P2 = 500 g watermelon rind juice: 7.5% pineapple honey juice; P3 = 500 g watermelon rind juice: 15% pineapple honey juice. Organoleptic test (hedonic test) with 4 scales, fiber content gravimetric method, potassium content AAS method, carried out in August 2023. Data analysis using SPSS program. The results of the organoleptic test of watermelon rind jelly drink with honey pineapple juice that the panelists liked the most was treatment P3, namely the addition of 15% honey pineapple juice with an average color value of 3.3 (like), aroma 3.2 (like), texture 3.6 (very like) and taste 3.6 (very like). Kruskall wallis test results obtained *p value* <0.000. Furthermore, the sample preferred by panelists (P3) was analyzed for fiber and potassium content. In conclusion, jelly drink treatment 3 (P3) has the highest acceptability, fiber content of 0.48 g, and potassium content of 89.60 mg. Through this study, Jelly drink treatment three (P3) can be an alternative snack for people with hypertension and the general public.

Keywords: watermelon rind, pineapple honey, jelly drink.

1. Introduction

Currently, watermelon rind is still considered an agricultural waste; usually, the rind and seeds are thrown away, which might have an adverse effect on the environment [1]; [2]. The albedo is the broadest and whitest area of the watermelon's skin. Watermelon rind contains several nutrients that are higher than the pulp. A watermelon's skin has 1165 mg of total amino acids on a 100 g new weight basis, whereas the flesh has 146 mg. Citrulline and arginine (61.4 and 53.8 mg/100 g, respectively) are likewise 1.5 times higher in the peel of watermelon than they are in the flesh. The essential amino acid quantities are, however, much lower in the rind. The main characteristics of

J. Jumakil et al. (eds.), *Proceedings of the 1st Halu Oleo International Conference on Public Health (HOICPH 2023)*, Advances in Health Sciences Research 77,
https://doi.org/10.2991/978-94-6463-427-3_11

watermelon rind—high concentrations of arginine and citrulline, relatively mild odor, and volatile chemicals with a fresh, cucumber-like scent—make it a promising food or beverage supplement. Research results [3] showed that watermelon rind has higher antioxidant activity, antimicrobial effects, and phenolic compounds compared to the pulp. Research results [4] It is known that watermelon rind contains quite high antioxidants, namely in round watermelon rind with a weight of 1.4 kg and a volume of 915 ml, 214.369 ppm was obtained. In addition, the rind of watermelon is an excellent source of minerals, vitamins, enzymes, and chlorophyll. Vitamins A, B2, B6, E, and C are among the vitamins present in watermelon rind. According to the study, nutrients including vitamin A, vitamin B2, vitamin B6, vitamin E, and vitamin C are present in albedo. [5] Albedo is a very suitable material to use and develop in Indonesia, according to the authors, since it includes nutrients like vitamins, citrulline, minerals, enzymes, and a high percentage of pectin (21.03%).

Watermelon rind contains a lot of L-citrulline, which may be converted to L-arginine. Nitric oxide (NO), a crucial substance that regulates vascular tone, can only be produced by the amino acid L-arginine.

Precursors of NO synthesis, such L-arginine, must be supplemented since vascular dysfunction precedes cardiovascular sickness. It is recommended to supplement with L-citrulline rather than L-arginine since the majority of L-arginine is catabolized during its passage to the endothelium. Increasing plasma L-arginine levels and vascular function may benefit from watermelon supplementation [6].

The use of arginine supplements in cardiovascular problems is supported by literature study findings, particularly in avoiding the development of hypertension and atherosclerosis[7]. Long-term oral arginine administration (e.g., vials containing 1.66 g/20 mL of salt-free arginine) has also been shown to promote arginine utilization for NO production. By regulating non-coding RNA, oral arginine (3 g/day Bioarginina®, Farmaceutici Damor, 2 vials/day) is also known to enhance endothelial function in hypertension patients.

Only 14% of the 1.4 billion individuals who have high blood pressure globally are able to control it, according to the WHO [7]. The prevalence of hypertension in Southeast Sulawesi Province (Sultra) was 23.0%7, in Kendari City it was 27.2%, and across Indonesia it was 31.4%, according to the Basic Health Research (Riskesdas) statistics from 2018 [8].

[9] Stated that there is a connection between elevated risks of cardiovascular disease (CVD) and hypertension, the risk factor that can be changed the most for all causes of morbidity and death worldwide. Pharmacological and non-pharmacological methods can be used to treat high blood pressure. Non-pharmacological methods are an integral part of hypertension management. One can alter their diet, adopt a diet high in calcium, magnesium, and potassium and low in salt and saturated fat, or experiment with cutting edge techniques like timing meal consumption to align with circadian cycles as examples of lifestyle adjustments [10].

[11] Explained that consuming more potassium lowers blood pressure in hypertensive individuals and has no negative impact on adult renal function, blood lipid concentrations, or catecholamine concentrations. An increased consumption of potassium was linked to a 24% reduction in the incidence of stroke. More potassium consumption may help prevent and regulate elevated blood pressure and stroke in most people without impaired renal potassium processing.

Raising the consumption of foods that are naturally low in salt, such as fruits and vegetables that don't require additional salt, may help reduce sodium intake while raising potassium intake[12]. Daily ingestion of pineapple can decrease the pro-inflammatory and antioxidant effects of hypercholesterolemia-induced heart lipid peroxidation in an in vivo model [13]. In male white rats (Rattus novergicus L.Merr), it is known that administering pineapple juice (Ananas comosus L.Merr) lowers triglyceride levels [15].

Consuming fruit and vegetable juices is a common practice worldwide and a useful strategy for boosting fruit and vegetable intake. Juices from fruits and vegetables have been shown to impact blood lipid profiles and blood pressure, two cardiovascular risk factors. The primary modes of action encompass anti-oxidant properties, enhancement of cardiovascular system functions, avoidance of hyperhomocysteinemia, suppression of platelet aggregation, and anti-inflammatory actions. Drinking juice, especially blended drinks that include a variety of polyphenols, vitamins, and minerals from different fruits and vegetables, may be a good way to improve cardiovascular health [14].

The tropical fruit pineapple (Ananas comosus (L) Merr) has yellow flesh and is high in potassium, calcium, iodine, acid, biotin, vitamin E, and the enzyme bromelain. Pineapple has many varieties, one of which is honey pineapple. Honey pineapple has a sweeter, fresher taste and has a higher pH when compared to other types of pineapple. The sugar content of honey pineapple is as much as 8.29 % [15], protein 0.54 g, carbohydrate 12.63 g, potassium 115 mg, fiber 1.4 g [16]. Research results [17] It is known that the best treatment in making watermelon jelly drink with honey substitution is P5, namely the concentration of 75 g honey and 500 g watermelon rind juice without additional sugar. Pineapple fruit is scientifically able to reduce the incidence of hypertension, reduce cholesterol levels so as to prevent stroke, reduce fever, accelerate wound healing, provide a diuretic effect, as a source of antioxidants and help increase leukocyte concentration. The decrease in blood pressure both systolic and diastolic in hypertensive patients is one of them due to the potassium content contained in pineapple fruit, which is for per 100 grams of pineapple contains 115 mg of potassium [18].

Jelly drink is a beverage product that is gel-shaped and has the characteristics of a consistent thick liquid with high water content and easy to suck. The sweetener commonly used in the manufacture of jelly drink is granulated sugar (sucrose) with other ingredients such as fruit juice, citric acid, and carrageenan. (Abdulloh et. al., 2019; Yowandita, 2018). The findings indicated that cutting back on added sugar by 2.3 teaspoons will lower blood pressure in both the systolic and diastolic domains by 8.4 and 3.7 mmHg, respectively[22]. Every increase in whole fruit consumption of 0.71 cups, will lower diastolic blood pressure by 2.8 mmHg. To improve cardiovascular health in older adults it is necessary to limit daily added sugar intake and increase fruit consumption.

Thus, researchers want to compare different amounts of pineapple honey juice and determine the sensory qualities, fiber content, and potassium content of the jelly drink made from watermelon rind.

2. Methods

This research compares watermelon rind juice (albedo) with honey pineapple juice on three different levels using a form of pre-experimental research using three treatments. P1 = 500 g watermelon rind juice: 0% honey pineapple juice; P2 = 500 g watermelon rind juice: 7.5% pineapple honey juice; P3 = 500 g watermelon rind juice: 15% pineapple honey juice. Organoleptic test using hedonic test (liking) with 4 scales (4 = very like, 3 = like, 2 = dislike, 1 = very dislike), semi trained panelists of 40 people, carried out at the Food Science Laboratory, Department of Nutrition, Kendari Health Polytechnic. Fiber content gravimetric method, potassium content AAS method, carried out at the Biology Laboratory FMIPA Haluoleo University Kendari. The research was conducted in August 2023. Data analysis of organoleptic test (hedonic test) using Kruskall wallis test, fiber and potassium content of watermelon rind jelly drink products with pineapple honey were analyzed descriptively. This study was conducted after obtaining an ethical *clearance* letter from the *Ethical* Commission for Health Research (KEPK) of the Regional Board of the Association of Public Health Experts of Southeast Sulawesi Province, Number. 123/KEPK-IAKMI/VIII/2023.

2.1 Making watermelon rind jelly drink with pineapple honey

The formulation utilized in this experiment is shown in Table 1.

Table 1. Watermelon rind jelly drink recipe made with pineapple honey

Treatment	Watermelon rind juice (g)	Pineapple honey juice (g)	Carrageenan (g)	Citric acid (g)
P1 (0%)	500	0	5	0,5
P2 (7,5%)	500	37,5	5	0,5
P3 (15%)	500	75	5	0,5

Source: [17] modified by researcher

2.2 Tools and Materials

This study used equipment including: gas stove, pot, small bowl, spoon, blender, plastic clip, cup, label, thermometer, analytical scales. The materials used include: watermelon rind, ripe honey pineapple, carrageenan, citric acid, mineral water.

2.3 Procedure of making

The method of making watermelon rind and pineapple honey jelly drink is as follows:

1. Preparation of watermelon rind juice. Ripe and fresh watermelon is washed thoroughly, peeled off the outer skin of the watermelon which is green in color. Separate the white inner watermelon rind (albedo) from the flesh. Fruit. Watermelon albedo is reduced in size, blended until smooth. Then filtered to obtain watermelon rind juice extract.
2. Preparation of honey pineapple juice. Ripe and fresh honey pineapple, peeled and washed. Shrink measure the honey pineapple, blend until smooth. Then

filtered to get honey pineapple juice extract.

3. Watermelon rind juice (albedo) was added to each pineapple juice according to the formulation on each treatment (P1, P2, P3), then heat for 3-4 minutes at 80-90°C.
4. In another container, mix the carrageenan with boiled water, stir evenly and then pour in the skin juice. Watermelon and pineapple honey. Add citric acid according to the formulation and stir until the solution is homogeneous.
5. After the cooking process, cooling at room temperature (26°C) for 1 hour.
6. The jelly drink is then packaged in plastic cups, stored in a refrigerator at <10°C.
7. Conduct organoleptic testing to determine the sensory characteristics and acceptability of the jelly drink product. watermelon rind and honey pineapple, and testing for fiber and potassium content.

3. Results

3.1 Acceptability of Color Attributes

Table 2 shows that the highest percentage of acceptance of color attributes in the category of very like is found in jelly drinks P3 (33.3%), P2 (6.7%), and P1 (6.7%). When the categories of very like and like are combined, the percentage of panelist acceptance is P3 (96.6%), P2 (86.7%), and P1 (83.3%), respectively. Furthermore, the sample preferred by panelists (P3) was analyzed for fiber and potassium content.

Table 2. Acceptability of color attributes

Hedonic Scale	P1		P2		P3	
	n	%	n	%	n	%
Very like	2	6,7	2	6,7	10	33,3
Like	23	76,6	24	80	19	63,3
Dislike	5	16,7	4	13,3	1	3,3
Strongly dislike	0	0	0	0	0	0
Total	30	100	30	100	30	100

The color acceptability of the watermelon rind jelly drink differs considerably across the treatments (P1, P2, and P3), as demonstrated by the $p = 0.004 < 0.05$ findings of the Kruskal Wallis test on color features.

3.2 Acceptability of Aroma Attributes

Table 3 shows that the highest percentage of acceptance of aroma attributes in the category of very like is found in jelly drinks P3 (33.3%), P2 (3.3%), and P1 (3.3%).

When the categories of very like and like are combined, the percentage of panelist acceptance is P3 (90%), P2 (53.3%), and P1 (30%) respectively.

Table 3. Acceptability of aroma attributes

Hedonic Scale	P1		P2		P3	
	n	%	n	%	n	%
Very like	1	3,3	1	3,3	10	33,3
Like	8	26,7	15	50	17	56,7
Dislike	17	56,7	13	43,3	3	10
Strongly dislike	4	13,3	1	3,3	0	0
Total	30	100	30	100	30	100

The results of the Kruskall Walls test for the fragrance attribute revealed a value of $p = 0.000 < 0.05$, suggesting that there is a significant difference in each treatment's aroma acceptability between the watermelon rind jelly drink and pineapple honey (P1, P2, and P3).

3.3 Acceptability of Texture Attributes

According to Table 4, jelly drinks P3 (63.3%), P2 (33.3%), and P1 (30%) have the greatest percentage of approval of texture features in the very like group. The proportion of panelist acceptance is P3 (96.6%), P2 (96.6%), and P1 (96.6%) when the very like and like categories are combined.

Table 4. Acceptability of texture attributes

Hedonic Scale	**P1**		**P2**		**P3**	
	n	**%**	**n**	**%**	**n**	**%**
Very like	9	30	10	33,3	19	63,3
Like	20	66,6	19	63,3	10	33,3
Dislike	1	3,3	1	3,3	1	3,3
Strongly dislike	0	0	0	0	0	0
Total	30	100	30	100	30	100

The p-value of the Kruskall Walls test on texture attributes in watermelon rind jelly drink with pineapple honey, which is less than 0.05, indicates that there are notable variations in the texture acceptability between the watermelon rind jelly drink and pineapple honey across all treatments (P1, P2, P3).

3.4 Acceptability of Taste Attributes

Table 5 shows that the highest percentage for the acceptability of flavor attributes in the very like category is found in jelly drinks P3 (60%), P2 (3.3%), and P1 (0%). When the categories of very like and like are combined, the percentage of panelist acceptance is P3 (96.7%), P2 (73.3%), and P1 (6.6%).

Table 5. Acceptability of flavor attributes

Hedonic Scale	P1		P2		P3	
	n	%	n	%	n	%
Very like	0	0	1	3,3	18	60
Like	2	6,6	21	70	11	36,7
Dislike	26	86,6	8	26,7	1	3,3
Strongly dislike	2	6,6	0	0	0	0
Total	30	100	30	100	30	100

The aspect of taste when comparing the watermelon rind jelly drink to the honey pineapple treatment P1, P2, and P3, the results of the Kruskall Walls test revealed a value of $p = 0.000 < 0.05$, showing a significant difference in taste acceptance.

3.5 Acceptability Based on All Assessment Attributes

Table 6 shows the acceptance based on a combination of color, scent, taste, and texture in jelly drink items.

Table 6. Average Overall Acceptability Score of Attributes

Characteristics	P1	P2	P3
Color	2,9	2,9	3,3
Aroma	2,2	2,5	3,2
Texture	3,3	3,3	3,6
Taste	2	2,8	3,6
Total	10,4	11,2	13,7
Average	**2,6**	**2,9**	**3,4**

Table 6 shows that based on the average number of scores, the combination of all (overall) attributes of color, aroma, taste, and texture can be seen that the largest score is found in jelly drink P3 (3.4), followed by P2 (2.9), and the lowest is P1 (2.6).

3.6 Proximate Test Results

Table 7. Fiber and Potassium Content of Jelly Drink per 100 g

No	Parameters	Unit	Results
1.	Fiber Content	g/100 g	0,48
2.	Potassium Content	mg/100 g	89,60

Based on table 7, the analysis of fiber and potassium content of watermelon rind jelly drink with pineapple honey treatment 3 (P3), shows that in 100 grams contains 0.48 g fiber and 89.60 mg potassium content.

4. Discussion

4.1 Acceptability of Color Attributes

In this research, the use of honey pineapple fruit as an ingredient in jelly drinks is an attempt to enhance the sensory elements of jelly beverages. Watermelon albedo has a white color, making the fruit skin brighter[5]. According to the research's findings, panelists preferred the P3 watermelon rind jelly drink with honey pineapple (96.6%) over the P1 and P2 products because of the P3 drink's darker yellow color, which results from the addition of 15% honey pineapple juice.

4.2 Acceptability of Aroma Attributes

Aroma is related to the olfactory sensory of the panelists towards the product. [19] Researchers from the University of California at the University of California at the University of California have discovered that the most prevalent phenolic compound in watermelon rind is 4-hydroxybenzoic acid (958.3 lg/g dw), which is followed by vanillin (851.8 lg/g dw) and coumaric acid (8.8 lg/g dw). Phenolic compounds are natural compounds that play a role in giving a distinctive aroma to food and beverage products, as food and beverage coloring agents, and as antioxidants[20].

The panelists' favorite jelly drink was jelly drink in treatment three (P3), which is 90% with 15% honey pineapple juice added. The scent of the jelly drink made will change depending on the amount of pineapple honey present. The aroma of P3 jelly drink is preferred by panelists because it has a stronger aroma typical of pineapple, compared to the treatment with the addition of pineapple juice at a lower concentration (7.5%). While in the P1 treatment (without the addition of honey pineapple juice), it has a slightly languid aroma that is less favored by panelists[21] A food or beverage's altered aroma as a result of heating-induced protein coagulation, caramelization of carbohydrates, evaporation of volatile chemicals, and breakdown of proteins and lipids.

Aroma is related to the panelist's olfactory sensory of the product. Salunkhe (1976) in[21], states that the aroma of food is influenced by the type, level of maturity, processing and storage. After color, the assessment of a food or beverage will be followed by the aroma generated. Consumers will be interested in trying a food seen from the color and aroma that is generated so that they are tempted to try it.

4.3 Acceptability of texture attribute

According to the research's findings, panelists' preferences for the jelly drink's texture varied significantly when honey pineapple concentration was added to watermelon rind jelly drink (significant difference, with a significant value of 0.025). The final texture is chewy, similar to other jelly drink products.[26] Fardiaz S. 1988 stated in Gelling that a continuous three-dimensional mesh is formed by the crosslinking of polymer chains. Additionally, water may be captured by this mesh or rendered immobile, allowing it to build a strong, stiff structure. The hedonic test results showed that treatment P3 had the highest favorability value compared to the texture of jelly drink treatments P1 and P2. This shows that the texture produced from watermelon rind jelly drink products is favored by panelists, where the texture produced is chewy like jelly drink products in general because of the addition of carrageenan.

The findings demonstrated that when the pineapple fruit ripens, the amount of water in the jelly drink would decrease as more carrageenan is added, but it will rise otherwise. This can be caused by the different water content of raw materials at each level of ripeness of pineapple. Meanwhile, the more ripe the pineapple used as raw material, the water content in the jelly drink will increase. [22] said that a material's viscosity will increase with the hydrocolloid concentration supplied. Because there are more dissolved particles in the solution due to its viscous nature, the water content of the mixture is lower.

4.4 Acceptability of Taste Attributes

Compared to other pineapple varieties, honey pineapple tastes sweeter and fresh, and it has a higher pH. Honey pineapple has a maximum sugar level of 8.29 g/100 g. 17. Based on the hedonic test results, treatment three (P3), which has a 96.7% acceptance rate for the taste of watermelon rind jelly drink with honey pineapple, is known to have the highest presentation. This is because the jelly drink contains a higher concentration of honey pineapple (15%), giving it a sweeter taste that panelists prefer.

4.5 Fiber and Potassium Content

The fiber content of the chosen product, treatment 3 (P3), which includes watermelon rind and pineapple honey, is 0.48 g according to the results of the proximate test, whereas the fiber content required by the jelly drink's quality requirements is 3.45 g. This indicates that the generated jelly drink's fiber level is still below the SNI criteria, meaning that even with the addition of 500 g of watermelon rind and 15% of pineapple honey, the jelly drink's fiber content does not satisfy the SNI's requirements for jelly drink quality.

The potassium level of treatment 3 (P3), the chosen product, which is a jelly drink

with watermelon rind and honey pineapple added, is 89.60 g, according to the findings of the relative test that was done. Because the potassium level of the jelly drink, as per the quality standards, is 470 mg, it can be determined that the fiber content of the jelly drink created with the addition of 500 g of watermelon rind and 15% honey pineapple does not satisfy the jelly drink based on SNI. This shows that the manufactured jelly drink's fiber content is still below the SNI criteria.

5. Conclusion

From the research results, it can be concluded that:

1. Acceptability in terms of color aspects is highest in the third treatment jelly drink (P3). Jelly drink the resulting watermelon rind is an attractive light of yellow color.
2. Acceptability in terms of the highest aroma aspect is found in jelly drink treatment three (P3) with the composition of 15% pineapple honey. The lowest panelist acceptance was found in treatment one (P1). The higher the composition. The honey pineapple in the jelly drink will break down the tartness of the watermelon rind.
3. Acceptability in terms of texture aspects is highest in jelly drink treatment three (P3) and panelist acceptance. The lowest was found in treatment one (P1). The addition of carrageenan and high composition of honey Pineapple can affect the texture quality of the jelly drink.
4. Acceptability in terms of taste aspects is highest in jelly drink treatment three (P3). The higher the composition honey pineapple will produce a jelly drink product with a sweeter flavor.
5. The highest acceptance of all aspects of assessment (color, aroma, texture, taste) is found in jelly drinks treatment three (P3) with the addition of 15% pineapple honey juice.
6. Jelly drink treatment three (P3) was the product submitted for proximate analysis. Results The proximate analysis was 0.48 g fiber content, and 89.60 mg potassium content.

Suggestions

Further research needs to be done to analyze other nutritional content in watermelon rind jelly drink with honey pineapple. It is recommended that for further research, the composition of honey pineapple be increased in order to increase the acceptance of watermelon rind jelly drink with honey pineapple, especially in terms of color, aroma and taste. Watermelon rind jelly drink with the addition of 15% honey pineapple juice (treatment three / P3) can be an alternative healthy snack for people with hypertension and the general public.

References

1. X. Du, M. Davila, J. Ramirez, and C. Williams, "Free Amino Acids and Volatile Aroma Compounds in Watermelon Rind, Flesh, and Three Rind-Flesh Juices," *Molecules*, vol. 27, no. 8, 2022, doi: 10.3390/molecules27082536.

2. A. Rezagholizade-shirvan, S. Shokri, S. M. Dadpour, and M. R. Amiryousefi, "Evaluation of physicochemical, antioxidant, antibacterial activity, and sensory properties of watermelon rind candy," *Heliyon*, vol. 9, no. 6, p. e17300, 2023, doi: 10.1016/j.heliyon.2023.e17300.
3. D. Neglo *et al.*, "Comparative antioxidant and antimicrobial activities of the peels, rind, pulp and seeds of watermelon (Citrullus lanatus) fruit," *Sci. African*, vol. 11, no. March, p. e00582, 2021, doi: 10.1016/j.sciaf.2020.e00582.
4. N. Diandra, Z. Ginting, E. Kurniawan, M. Muhammad, and S. Bahri, "Pembuatan Permen Jeli Dari Sari Kulit Semangka Dengan Penambahan Kadar Gula," *Chem. Eng. J. Storage*, vol. 2, no. 4, p. 16, 2022, doi: 10.29103/cejs.v2i4.6605.
5. K. K. Devi Dwi Siskawardani, Rias Anggun Kartika, Warkoyo, "The study of watermelon rind (Citrullus lanatus) and pinenapple fruit (Ananas comosus L.) proportion with caragenan addition on fruit leather physicochemical characteristics," *ejournal.umm.ac.id*, no. May, pp. 71–80, 2018, doi: https://doi.org/10.22219/FTHS.
6. M. Volino-Souza, G. V. de Oliveira, C. A. Conte-Junior, A. Figueroa, and T. S. Alvares, "Current Evidence of Watermelon (Citrullus lanatus) Ingestion on Vascular Health: A Food Science and Technology Perspective," *Nutrients*, vol. 14, no. 14, pp. 1–15, 2022, doi: 10.3390/nu14142913.
7. W. H. Organization, *Guideline for the pharmacological treatment of hypertension in adults*. 2021.
8. Kemenkes RI, "Hasil Riset Kesehatan Dasar Tahun 2018," *Kementrian Kesehat. RI*, vol. 53, no. 9, pp. 1689–1699, 2018.
9. S. et al. Oparil, "Hypertension," *Nat. Rev. Dis. Prim.*, vol. 22, no. 4, pp. 1–48, 2019, doi: 10.1038/nrdp.2018.14.Hypertension.
10. N. Verma *et al.*, "Non-pharmacological management of hypertension," *J. Clin. Hypertens.*, vol. 23, no. 7, pp. 1275–1283, 2021, doi: 10.1111/jch.14236.
11. N. J. Aburto, S. Hanson, H. Gutierrez, L. Hooper, P. Elliott, and F. P. Cappuccio, "Effect of increased potassium intake on cardiovascular risk factors and disease: Systematic review and meta-analyses," *BMJ*, vol. 346, no. 7903, pp. 1–19, 2013, doi: 10.1136/bmj.f1378.
12. L. Z. J. K. C. A. C. G. J. G. D. M. H. S. L. J. A. M. D. R. R. S. S. A. T. M. E. C. Rebecca C. Woodruff, "Top Food Category Contributors to Sodium and Potassium Intake — United States, 2015–2016," *Morb. Mortal. Wkly. Rep. Among*, vol. 69, no. 32, 2020, doi: 10.1161/HYP.0000000000000065.
13. P. Seenak, S. Kumphune, W. Malakul, R. Chotima, and N. Nernpermpisooth, "Pineapple consumption reduced cardiac oxidative stress and inflammation in high cholesterol diet-fed rats," *Nutr. Metab.*, vol. 18, no. 1, pp. 1–10, 2021, doi: 10.1186/s12986-021-00566-z.
14. J. Zheng *et al.*, "Effects and mechanisms of fruit and vegetable juices on cardiovascular diseases," *Int. J. Mol. Sci.*, vol. 18, no. 3, 2017, doi: 10.3390/ijms18030555.
15. S. H. Ni Ketut Ayu Krisna Devi, Komang Ayu Nocianitri1, "Pengaruh Konsentrasi Sukrosa terhadap Karakteristik Minuman Probiotik Sari Buah Nanas Madu (Ananas comosus (L.) Merr) Terfermentasi dengan Isolat Lactobacillus rhamnosus SKG34," *J. Ilmu dan Teknol. Pangan*, vol. 3, 2022.
16. D. Fikania, "Pengaruh Perbandingan Buah Nanas Madu Dengan Sukrosa Dan Suhu Inkubasi Terhadap Karakteristik Starter Alami Nanas Madu (Ananas Comosus L)," UNIVERSITAS PASUNDAN BANDUNG, 2017.
17. Abdulloh, Nurulhuda, Bekti, Endang, S. Haryati, and E. Y. Sani, "Fisikokimia Dan Organoleptik Jelly Drink Buah Semangka (Citrullus Lanatus) Dengan Subtitusi Madu (Apis)," pp. 1–8, 2019.
18. L. Angelika, N. Annisa, and F. Prasetya, "Pengaruh Jus Buah Nanas Kombinasi Madu sebagai Penurun Tekanan Darah pada Pasien Hipertensi," *Proceeding Mulawarman Pharm. Conf.*, vol. 11, pp. 70–75, 2020, doi: 10.25026/mpc.v11i1.396.
19. H. M. A. Al-Sayed and A. R. Ahmed, "Utilization of watermelon rinds and sharlyn melon

peels as a natural source of dietary fiber and antioxidants in cake," *Ann. Agric. Sci.*, vol. 58, no. 1, pp. 83–95, 2013, doi: 10.1016/j.aoas.2013.01.012.
20. N. P. A. Astiti, "Analisis Kandungan Fenolik Ekstrak Daun Jati (Tectona Grandis L.) Dengan Waktu Dekomposisi Yang Berbeda," *Metamorf. J. Biol. Sci.*, vol. 4, no. 1, p. 122, 2017, doi: 10.24843/metamorfosa.2017.v04.i01.p18.
21. R. Saragih, "Uji Kesukaan Panelis Pada Teh Daun Torbangun (Coleus Amboinicus)," *J. WIDYA Kesehat. Dan Lingkung.*, vol. 1, no. 1, pp. 46–52, 2014.
22. G. S. Wicaksono and E. Zubaidah, "Pengaruh Karagenan dan Lama Perebusan Daun Sirsak Terhadap Mutu dan Karakteristik Jelly Drink Daun Sirsak," *J. Pangan dan Agroindustri*, vol. 3, no. 1, pp. 281–291, 2015.