

Soluble Fiber Content and Acceptance in The Combination of Avocado and Apple Juice

¹Luthfia Atikasari, ²Mohammad Jaelani, ³Yuwono Setiadi, ⁴Yuniarti, and ⁵Ria Ambarwati

¹Politeknik Kesehatan Kementerian Kesehatan Semarang, Indonesia, luthfiaatikasari10@gmail.com

²Politeknik Kesehatan Kementerian Kesehatan Semarang, Indonesia, 10jaelani@gmail.com

³Politeknik Kesehatan Kementerian Kesehatan Semarang, Indonesia, yuwonopoltekkes@yahoo.com

⁴Politeknik Kesehatan Kementerian Kesehatan Semarang, Indonesia, yuni4rti1976@yahoo.com

⁵Politeknik Kesehatan Kementerian Kesehatan Semarang, Indonesia, ria_mgiz09@yahoo.com

Corresponding author: Luthfia Atikasari, e-mail: luthfiaatikasari10@gmail.com

ABSTRACT

Avocados and apples are one of the foods high in soluble fiber that can be processed into functional drinks as an alternative food in overcoming hypercholesterolemia. Knowing the soluble fiber content and acceptability in the combination of avocado and apple juice. This study used an experimental method with a randomized design, consisting of 3 formulas, namely 50:50, 60:40, and 70:30 with 4 treatments. Water soluble fiber content by using enzymatic-test. Acceptance test on 30 women of childbearing age. Data analysis used one-way ANOVA test. The average soluble fiber content in the juice combination formula were 50:50 (8,19 g), 60:40 (9,81 g) and 70:30 (11,01 g). The acceptability test for the 50:50 and 60:40 formulas was rated somewhat like to like with an average rating on each parameter, which was 2,77 to 3,73. The combination of avocado and apple juice contributes 25,61 – 37,98% of fiber to the WUS RDA. The most preferred formula in the acceptability test assessment was 50:50 with an average fiber content of 8,19 g which was able to meet 28,26 – 27,32% of the daily fiber requirement.

ARTICLE INFORMATION

Submitted: 30/09/2021

Revised: 09/11/2021

Accepted: 20/11/2021

Publish Online: 22/11/2021

Keywords:

Acceptability

Apple

Avocado

Combination juice

Soluble fiber

How to cite this article: Atikasari, L., Jaelani, M., Setiadi, Y., Yuniarti, Ambarwati, R., (2021). Soluble Fiber Content and Acceptance in The Combination of Avocado and Apple Juice. *Journal of Nutrition Science*, 2 (2), 23-31

Introduction

Hypercholesterolemia is a condition where high cholesterol levels in the blood exceed 200 mg/dl (Purhadi et al., 2019). The prevalence of high cholesterol according to gender, in men is 48% while women are higher at 54.3%. In Central Java, the prevalence of high cholesterol reached 48.1%. The 2018 Basic Health Research stated that based on gender, the proportion of the Indonesian population aged over 15 years who had cholesterol levels above normal, namely women, was 24% higher than men, which was 18.3% (Indonesian Ministry of Health Research and Development Agency, 2018).

Efforts that can be made in overcoming hypercholesterolemia are pharmacological therapy and non-pharmacological therapy. Pharmacological therapy is the use of chemical drugs which can cause

side effects. This makes non-pharmacological treatment is also needed to reduce drug doses by utilizing dietary fiber from fruits such as avocados and apples.

Avocado (*Persea americana*) is a fruit that is high in monounsaturated fatty acids (MUFA), soluble fiber that plays a role in lowering LDL cholesterol and niacin (vitamin B3) which can help raise HDL cholesterol. Fat content reaches 71-81% of total calories or about 20 times that of the average other fruit and 7 grams of fiber per 100 grams of which 25% is soluble fiber and 75% insoluble fiber. (Budiawan, Mayulu and Rattu, 2019, Nurman and Afifah, 2019 and Muzakar and Audina, 2018). While apples (*Malus domestica*) are fruits that contain pectin which binds LDL cholesterol levels in the body and increases HDL levels (Nurman and Afifah, 2019).

Based on the description above, the researchers are interested in conducting research on "Soluble Fiber Levels and Acceptance in the Combination of Avocado and Apple Juice" with the aim of knowing the soluble fiber content and acceptability of the combination of avocado and apple juice products.

Methods

This study used an experimental method with a completely randomized design, consisting of 3 formulas with 4 repetitions. The influence variable used is the combination formulation of avocado and apple juice, namely K1 = avocado: apple (50:50), K2 = avocado: apple (60:40), and K3 = avocado: apple (70:30), while the affected variables are soluble fiber content and acceptability.

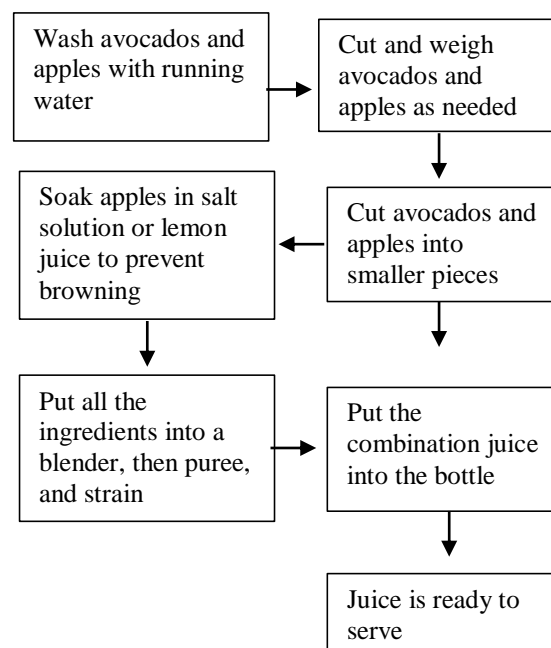
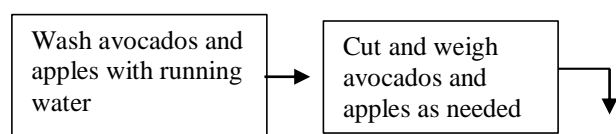
This research was conducted at the researcher's house in Pedurungan Kidul Semarang. The ingredients used to make the juice combination were obtained from avocado farmers in the Bandungan area, Semarang and the apples were purchased from the ADA Majapahit supermarket, Semarang. The combination formulation of avocado and apple juice can be seen in table 1.

Table 1. Combination Formulation of Avocado and Apple Juice

Ingredients	Formulation of Avocado and Apple Juice		
	K1 (50:50)	K2 (60:40)	K3 (70:30)
Avocado	125 g	150 g	175 g
Appel	125 g	100 g	75 g
Water	155 ml	155 ml	155 ml

Soluble fiber content was obtained from laboratory tests using the enzymatic method at the Chem-Mix Laboratory Pratama Bantul, Yogyakarta. Acceptability data was obtained by hedonic organoleptic test conducted by 30 consumer panelists in the form of Women of Childbearing Age (WUS). Data processing is done with Microsoft Excel and data processing applications, namely SPSS 21.0. Normality test using Shapiro Wilk. The results of the soluble fiber content test used a one-way ANOVA test and further tests were carried out for BNT (Least Significant Difference) or LSD (Less Significances Different), while the data from the acceptability test results used Kruskal Wallis.

Making Process



Results and Discussion

Acceptance

1. Organoleptic Test (Hedonic)

Organoleptic test is a test method using human senses as the main tool in measuring the acceptability of a product (Iswendi et al., 2019). While the hedonic test is one type of acceptance test of a product (Novita et al., 2017). In this study, the hedonic test was carried out to determine the level of consumer preference and acceptance of the combination of avocado and apple juice based on the parameters of color, taste, aroma, and texture. This hedonic test was carried out by consumer panelists, namely women of childbearing age in the Pedurungan area of Semarang City as many as 30 people. The hedonic test was carried out by presenting 3 formulas for the combination of avocado and apple juice with different codes. The assessment of this test is carried out by giving a score or value for each parameter of color, taste, aroma, and texture in each formula of the combination of avocado and apple juice with assessment criteria, namely 1 (dislike very much), 2 (dislike), 3 (somewhat like), 4 (like), and 5 (like very much) (Hariati et al., 2018). The higher the value given, the panelists will like the formula presented and see the differences between products at the product development stage (Afriani et al., 2019).

Table 2. The average organoleptic test assessment on the color, taste, scent, and texture of the combination of avocado and apple juice

Parameter	Treatment	Mean±SD	P value
Colour	K1	3,40±0,855	0,085
	K2	3,73±0,640	
	K3	3,90±0,759	
Taste	K1	3,43±0,858	0,000
	K2	2,77±0,626	
	K3	2,30±0,702	
Scent	K1	3,23±0,817	0,419
	K2	3,07±0,691	
	K3	3,07±0,640	
Texture	K1	3,30±0,750	0,414
	K2	3,23±0,935	
	K3	3,03±0,890	

Information :

K1 = combination of avocado and apple juice with a ratio of 50:50

K2 = combination of avocado and apple juice with a ratio of 60:40

K3 = combination of avocado and apple juice with a ratio of 70:30

In the color parameter, the results of the normality test using Shapiro-Wilk, obtained p-value = 0.000 which means that the data is not normally distributed so that the statistical test is continued with the Krsukal-Wallis test and obtained p-value = 0.085. It means that there is no effect of avocado and apple composition on the color of the three combination formulas of avocado and apple juice. In the taste parameter, the results of the normality test using Shapiro-Wilk, obtained p-value = 0.000 which means that the data is not normally distributed so that the statistical test is continued with the Krsukal-Wallis test and obtained p-value = 0.000. It means that there is an effect of the composition of avocado and apple on the taste of the three combination formulas of avocado and apple juice. In the aroma parameter, the normality test results using Shapiro-Wilk obtained p-value = 0.000 which means that the data is not normally distributed so that the statistical test is continued with the Krsukal-Wallis test and obtained p-value = 0.419. It means that there is no effect of avocado and apple composition on the aroma of the three combination formulas of avocado and apple juice. Then on the texture parameters of the results of the normality test using Shapiro-Wilk, p-value = 0.000 was obtained, which means that the data was not normally distributed so that the statistical test was continued with *Krsukal* - Wallis test and obtained p-value = 0.414. It means that

there is no effect of avocado and apple composition on the texture of the three combination formulas of avocado and apple juice.

Color is the first impression that is seen and appears and assessed by panelists in serving food (Lamusu, 2018). Color is one of the factors that can affect the level of liking and acceptance of a product. Color as the main attraction of a product before consumers judge the other qualities of the product. One of the ingredients in the formula for the combination of avocado and apple juice that can affect the color of the juice combination is the presence of apples which can cause browning, so the color of the juice can turn brown. In this study, the color of the combination of avocado and apple juice gets brown when the composition of apples is used more and more. According to Purwanto and Effendi, apples will experience a decrease in quality when they have gone through the cutting process because the apples will change color to browning due to the oxidation process. This process is triggered by an oxidation reaction catalyzed by the *phenol oxidase* enzyme (Purwanto & Effendi, 2016). The browning process on apples not only reduces the appearance quality but also reduces the taste of the apples themselves. In addition, it can cause a decrease in the appearance, organoleptic properties, and market value of the apples (Arsa, 2016). The browning process can be prevented by adjusting the pH to low because the polyphenol oxidase enzyme will decrease along with the low pH (Saringsih & Srimati, 2018).

Table 3. The difference in the mean color of the avocado and apple juice combination

Treatment	Mean Difference	P value
K1 K2	0,333	0,930
K2 K3	0,167	0,362
K3 K1	0,500	0,200

Based on the table above, there is no significant difference between the color parameters of the K1, K2, and K3 formulas because the p-value > 0.05, which means there is no significant difference.

Taste is one way to choose food based on the difference in the taste of the food. Taste is influenced by 3 factors, namely smell, taste, and oral stimulation (hot or cold). The first factor is detected through the sense of smell and the second and third factors are detected by sensory cells in the sense of taste (Manurung & Suriono, 2020).

Table 4. The difference in the mean taste of the combination of avocado and apple juice

Treatment		Mean Difference	P value
K1	K2	0,667	0,010
K2	K3	0,467	0,009
K3	K1	1,133	0,000

Based on the table above, it can be concluded that there are significant differences between the taste parameters of the K1, K2, and K3 formulas. In the K1 and K2 formulas with a 95% confidence level, p-value = 0.010 ($p < 0.05$) was obtained, which means that there was a significant difference between the taste parameters of the K1 and K2 formulas. Meanwhile, in the K2 and K3 formulas with a 95% confidence level, p-value = 0.009 ($p < 0.05$) was obtained, which means that there was a significant difference between the taste parameters for the K2 and K3 formulas, as well as in the K3 and K1 formulas with a 95% confidence degree. we get p-value = 0.000 ($p < 0.05$) which means that there is a significant difference between the taste parameters of the K3 and K1 formulas.

Scent is a reaction from food that will affect consumers before enjoying food, consumers can smell (smell of smell) the food before enjoying it (Adinugraha & H, 2015). Consumers are able to judge whether a food is delicious or not, it can be seen from the scent produced and from the ingredients contained in the food (Violita & Purba, 2021). The more avocado composition in the juice combination, the lower the level of preference for scent. This can be caused by the quality of the avocado which has begun to decline as if it is too ripe so that an sour-like scent appears (Ashari, 2020).

Table 5. The difference in the mean scent of the combination of avocado and apple juice

Treatment		Mean Difference	P value
K1	K2	0,167	0,010
K2	K3	0,000	1,000
K3	K1	0,000	1,000

Based on the table above, it can be concluded that there is no significant difference between the scent parameters on the K1, K2, and K3 formulas because the p-value > 0.05 , which means there is no significant difference.

Texture is psychophysical which means that it can be measured physically and psychologically by the senses. Meanwhile, from the point of view of the senses, texture is related to feeling. So that food texture can only be assessed after the food is consumed (Noor, 2017). The more avocado composition in the juice combination, the lower the level of preference for

texture. This is because the composition of many avocados in the combination formulation of avocado and apple juice will make the juice thicker.

Table 6. The difference in the mean texture of the combination of avocado and apple juice

Treatment		Mean Difference	P value
K1	K2	0,067	0,762
K2	K3	0,200	0,400
K3	K1	0,267	0,215

Based on the table above, it can be concluded that there is no significant difference between the texture parameters of the K1, K2, and K3 formulas because the p-value > 0.05 , which means there is no significant difference.

2. Big Portion

Big portion aims to see whether the combination formula of avocado and apple juice can be accepted by consumers or not. This acceptance was carried out by consumer panelists, namely women of childbearing age in the Pedurungan area of Semarang City as many as 30 people. Acceptance is done by presenting 3 formulas for the combination of avocado and apple juice with different codes and given on different days. This acceptance assessment is seen from how many portions are able to be spent by the panelists. If you can spend up to 50% of the portion served, the formula can be accepted by consumers.

Table 7. Distribution of large portion ratings on the combination of avocado and apple juice

Big Portion	Formula			Total
	K1	K2	K3	
	N	N	N	N
0%	1	1	3	5
25%	2	7	17	26
50%	12	16	9	37
75%	7	5	0	12
95%	5	1	1	7
100%	3	0	0	3
Sum	30	30	30	90

From the table above, it can be stated that in the K1 formula there are 1 person who has not been able to finish the juice, 2 people are able to drink up to 25% of the portion served, 12 people are able to spend up to 50% of the portion served, 7 people are able to spend up to 75% of the portion served. servings, 5 people are able to consume up to 95% of the servings served, and 3 people are able to finish all the juices served. In the K2 formula there are 1 person who has not been able to finish the served juice, 7 people are able to spend up to 25% of the serving served, 16

people are able to spend up to 50% of the served portion, 5 people are able to spend up to 75%, and 1 person is able to spend up to 95% of servings. While in the K3 formula there are 3 people who are unable to finish the served juice, 17 people are able to spend up to 25% of the serving served, 9 people are able to spend up to 50% of the served portion, and 1 person is able to spend up to 95% of the served portion. .

Based on the table, it can be concluded that in the K1 formula there were 27 people who were able to spend up to 50% of the juice so that it can be said that the K1 formula from the combination of avocado juice was acceptable to consumers. While in the K2 formula there are 22 people who are able to drink a combination of 50% juice so it can be said that the K2 formula from a combination of avocado juice is acceptable to consumers, and in the K3 formula there are only 10 people who are able to drink a combination of 50% juice so it can be said that the K3 formula from the combination of avocado juice has not been accepted by consumers because there are still few panelists who can drink juice up to 50%.

Water Soluble Fiber Content

The content of soluble fiber is fiber that is able to bind fat in the small intestine, therefore this type of fiber can help lower cholesterol levels in the blood (Fairudz & Nisa, 2015). In this study, the water soluble fiber content in the combination of avocado and apple juice was obtained using the Enzymatic method carried out at the Chem-Mix Laboratory, Bantul, Yogyakarta. The soluble fiber content test was repeated 4 times, where each treatment was coded as K1 (50:50), K2 (60:40) and K3 (70:30). The test was treated 4 times to get accurate and relevant results. The results of the analysis of soluble fiber content can be seen in table 8.

Table 8. Average results of laboratory tests for soluble fiber content of a combination of avocado and apple juice

Avocado and Apple Juice Combination Treatment	Soluble Fiber Content (g)
K1 (50:50)	8,1961
K2 (60:40)	9,8103
K3 (70:30)	11,0144

Table 8 shows that the soluble fiber content in the combination formula of avocado and apple juice K1 (50:50) is 8.161 g/100 g, K2 (60:40) is 9.8103 g/100 g, and K3 (70:40 g). 30) of 11.0144 g/100 g.

Based on the results of the study showed that the more avocado composition in the combination of avocado

and apple juice, the higher the soluble fiber content in the combination of avocado and apple juice, because the avocado itself is rich in fiber, every 2 tablespoons of avocado contains about 2 grams of fiber, so the whole flesh of the fruit contains about 10 grams of fiber (Wijayanti et al., 2014). This is in line with research by Muzakar and Audina which states that every 100 grams of avocado contains 7 grams of fiber, of which 25% is soluble fiber and 75% is insoluble fiber (Muzakar & Audina, 2018). While apples only have 2.6 grams of fiber for every 100 grams of apples (TKPI, 2017).

Table 9. Average soluble fiber content of the combination of avocado and apple juice

Formula	Mean±SD	P value
K1	8,196±0,812	0,000
K2	9,810±0,082	0,000
K3	11,014±0,301	0,000

The results of the normality test using Shapiro-Wilk obtained p-value = 0.546 which means the data is normally distributed so that the statistical test is continued with the one-way ANOVA test and obtained p-value = 0.000 which means that there is a significant effect between the combination formulation of avocado and apple juice on fiber. late. Then continued with Duncan's test and obtained p-value = 0.000 (p<0.05). This also indicates that all the combination treatments of avocado and apple juice affect the soluble fiber content.

Table 10. The difference in the average soluble fiber content of the combination of avocado and apple juice

Treatment	Mean Difference	P value
K1 K2	1,614	0,007
K2 K3	1,204	0,040
K3 K1	2,818	0,038

Based on 18 it can be concluded that there is a significant difference between the soluble fiber content and the combination formula of avocado and apple juice. In the K1 and K2 formulations with a 95% confidence level, the p-value = 0.007 (p<0.05) which means there is a significant difference between the soluble fiber content in the K1 and K2 formulas. Meanwhile, in the K2 and K3 formulas with a 95% confidence level, p-value = 0.040 (p<0.05) was obtained, which means that there was a significant difference between the soluble fiber content in K2 and K3 formulas, as well as in K3 and K1 formulas with a 95 confidence degree. % obtained p-value = 0.038 (p<0.05) which means that there is a significant

difference between the levels of soluble fiber in the K3 and K1 formulas.

The formulation composition of the combination of avocado and apple juice was made different, which caused the soluble fiber test results to be different. The K3 formula contains more avocado composition than the K1 and K2 formulas. The composition in formula K1 has a ratio of 50:50 between avocado and apple while formula K2 has a ratio of 60:40 between avocado and apple.

Fiber Contribution of Avocado and Apple Juice Combination Based on RDA for Women of Childbearing Age (WUS)

The contribution of fiber in women of childbearing age can be seen in table 11 below.

Table 11. Fiber contribution of the combination of avocado and apple juice based on the RDA for women of childbearing age

Formula	Mean Fiber Content (g)	Contribution (%)		
		13-18 years old	19-29 years old	30-49 years old
K1	8,1961	28,26	25,61	27,32
K2	9,8103	33,82	30,65	32,70
K3	11,0144	37,98	34,42	36,71

Every 1 serving of 250ml avocado and apple combination juice (1 bottle) of formula K1 can contribute fiber by 28.26% for ages 13-18 years, 25.61% for ages 19-29 years, and 27.32% for ages 30-49 years. In the K2 formula, it can contribute 33.82% fiber for 13-18 years old, 30.65% for 19-29 years old, and 32.70% for 30-49 years old. While the K3 formula can contribute fiber by 37.98% for ages 13-18 years, 34.42% for ages 19-29 years, and 36.71% for ages 30-49 years. The results showed that the combination of avocado and apple juice with the formula K1 (50:50), K2 (60:40), and K3 (70:30) had met the adequacy of fiber at least 20% of the RDA for women of childbearing age. Food is said to be high in fiber content if it is able to meet the adequacy of at least 20% of the recommended RDA for each serving (RDA, 2019).

Soluble fiber is able to bind fat so that it can reduce cholesterol levels by up to 5%. Not only that, fiber is also able to excrete bile acids which causes the synthesis of bile acids to increase. This increase in bile acids can cause the liver to take up more cholesterol, resulting in a decrease in cholesterol (Utama & Yunita, 2019). Therefore, dietary fiber can reduce high cholesterol levels. Thus, the fiber content in the combination of avocado and apple juice can help

prevent or reduce high cholesterol in the blood. In addition, it can prevent the risk of atherosclerosis and cardiovascular events due to high cholesterol (Santoso, 2011).

Conclusion

There is a significant effect between the composition of avocado and apple on the soluble fiber content of the combination of avocado and apple juice. There was no significant effect between the composition of avocado and apple on color parameters in the organoleptic test of the combination of avocado and apple juice. There is a significant effect between the composition of avocado and apple on taste parameters in the organoleptic test of the combination of avocado and apple juice. There was no significant effect between the composition of avocado and apple on aroma parameters in the organoleptic test of the combination of avocado and apple juice. There was no significant effect between the composition of avocado and apple on texture parameters in the organoleptic test of the combination of avocado and apple juice. The combination formula of avocado and apple juice contributed the highest addition of soluble fiber as much as 37.98% and the lowest as much as 25.61%. And the combination formula of avocado and apple juice that can be accepted by consumers is the K1 formula with a ratio of 50:50 and the K2 formula with a ratio of 60:40.

Acknowledgement

The author would like to thank the Undergraduate Study Program in Applied Nutrition and Dietetics, Department of Nutrition, Poltekkes, Ministry of Health, Semarang, which has facilitated the research and supervisors and examiners who always provide direction and guidance patiently. In addition, the authors also thank the research respondents for their participation and contribution in this study.

Author Contribution and Competing Interest

The author greatly contributed to the implementation and preparation of research, from the preparation of tools and materials to the testing process for respondents and laboratories

References

- Adinugraha, A. T., & H, S. M. (2015). Analisa Pengaruh Kualitas Makanan Dan Persepsi Harga Terhadap Kepuasan Konsumen D'cost Surabaya. *Jurnal Hospitality Dan Manajemen*

- Jasa*, 3, 643–655.
<http://publication.petra.ac.id/index.php/manajemen-perhotelan/article/view/3571/3239>
- Afriani, Y., Wahyuningsih, S., Kadaryati, S., & Yuliana, E. P. (2019). Uji Organoleptik Formula Minuman Olahraga Berbasis Jamur Tiram Putih (*Pleurotus ostreatus*). *Prosiding Seminar Nasional*, 1.
<http://prosiding.respati.ac.id/index.php/PSN/article/view/238/232>
- AKG. (2019). *Angka Kecukupan Gizi Yang Dianjurkan Untuk Masyarakat Indonesia*.
- Apriliani, R., Tamrin, & Hermanto. (2019). Pengaruh Penambahan Kayu Manis (*Cinnamomum verum*) Terhadap Karakteristik Organoleptik Dan Antioksidan Minuman Sari Buah Alpukat (*Persea americana mill*). *Jurnal Sains Dan Teknologi Pangan*, 4, 2621–2634.
<http://ojs.uho.ac.id/index.php/jstp/article/viewFile/10900/7734>
- Arsa, M. (2016). *Proses Pencoklatan (Browning Process) Pada Bahan Pangan* [Universitas Udayana Denpasar Bali].
<https://repositori.unud.ac.id/protected/storage/upload/repositori/19253af34abbc36474ef96547318f9d.pdf>
- Ashari, A. (2020). *Suka Simpan Alpukat di Rumah? Perhatikan Tanda Alpukat Sudah Tidak Baik Dikonsumsi*. Bobo.
<https://bobo.grid.id/read/082075117>
- Badan Penelitian dan Pengembangan Kesehatan Kemenkes RI. (2018). *HASIL UTAMA RISKESDAS 2018*.
https://kesmas.kemkes.go.id/assets/upload/dir_519d41d8cd98f00/files/Hasil-risikesdas-2018_1274.pdf
- Badan Standarisasi Nasional. (2014). *Minuman sari buah SNI 3719:2014*. www.bsn.go.id
- Bisu, Y. N. (2018). *Aktivitas Antioksidan Dan Sifat Kimia Jus Alpukat Dengan Variasi Konsentrasi Penambahan Gel Lidah Buaya (Aloe vera var. Chinensis)* [Universitar Mercu Buana Yogyakarta]. <http://eprints.mercubuanayogyakarta.ac.id/id/eprint/5164>
- Budiawan, H., Mayulu, N., & Rattu, A. J. M. (2019). Pengaruh Pemberian Alpukat Dengan Atau Tanpa Senam Aerobik Terhadap Kadar Kolesterol Higd Density Lipoprotein (HDL) Pada Wanita Dewasa Muda Di Universitas Katolik De La Salle Manado. *Graha Medika Nursing Journal*, 2, 82–90.
- D, G., & Pamplona-Roger. (2016). *Makanan Menyehatkan* (R. M. Hutasoit (ed.); Pola Hidup). Editorial Safeliz dan Indonesia Publishing House. www.safeliz.com
- Dai, F.-J., & Chau, C.-F. (2017). Classification and regulatory perspectives of dietary fiber. *Journal of Food and Drug Analysis*, 37–42.
<https://doi.org/http://dx.doi.org/10.1016/j.jfda.2016.09.006>
- Dr. Mehmet. (2017). *Food Can Fix It* (M. Ariyani (ed.); 1st ed.). Bhuana Ilmu Populer.
- Fairudz, A., & Nisa, K. (2015). Pengaruh Serat Pangan terhadap Kadar Kolesterol Penderita Overweight. *MAJORITY*, 4, 121–126.
<http://juke.kedokteran.unila.ac.id/index.php/majority/article/view/1485/1324>
- Hariati, N., Ansharullah, & Asyik, N. (2018). Pengaruh Penambahan Tepung Beras Merah (*Oriza nivara l.*) Terhadap Uji Organoleptik Dan Proksimat Bolu Kukus. *Jurnal Sains Dan Teknologi Pangan*, 3.
<http://ojs.uho.ac.id/index.php/jstp/article/viewFile/3973/3049>
- Ifora, Dharma, S., & Darma, D. M. (2016). Pengaruh Pemberian Kombinasi Jahe Merah, Bawang Putih, Apel, Lemon Dan Madu Terhadap Kadar Kolesterol Total Dan Histopatologis Pembuluh Darah Aorta Jantung Tikus Putih Jantan. *Jurnal Farmasi Higea*, 8, 163–174.
diken2094@gmail.com
- Indrawati, V. P. (2018). Efektivitas Pemberian Jus Tomat Dan Jus Apel Terhadap Perubahan Kadar Kolesterol Darah Pada Orang Dewasa Dengan Hiperkolesterolemia Di Posbindu Wilayah Puskesmas Bendo [STIKES Bhakti Husada Mulia]. In *Doctoral Dissertation, STIKES Bhakti Husada Mulia*. <http://repository.stikes-bhm.ac.id/id/eprint/134>
- Iswendi, Yusmaita, E., & Pangestuti, A. D. (2019). Uji Organoleptik Sari Jagung Di Laboratorium Kimia FMIPA UNP. *Jurnal Ilmiah Pengabdian Keapada Masyarakat*, 19.
<https://doi.org/http://dx.doi.org/10.2403/sb.0100>

- Izzati, W., & Salsabila, R. M. V. (2018). Pengaruh Jus Apel Hijau Terhadap Penurunan Kolesterol Pada Penderita Hipertensi Di Nagari Kapalo Koto Wilayah Kerja Puskesmas Tigo Baleh Bukittinggi Tahun 2017. *Afiyah*, 5, 66–70. [http://www.ejournal.stikesyarsi.ac.id/index.php/JAV1N1/article/download/159/242#:~:text=Apel memang makanan bebas kolesterol,darah \(Anies%2C 2015\)](http://www.ejournal.stikesyarsi.ac.id/index.php/JAV1N1/article/download/159/242#:~:text=Apel%20memang%20makanan%20bebas%20kolesterol,darah).
- Jayanti, W. T. (2017). Substitusi Tepung Terigu Dengan Tepung Biji Alpukat Terhadap Sifat Fisik Cookies. Universitas Diponegoro Semarang.
- Kemenkes. (2016). *Profil Penyakit Tidak Menular Tahun 2016* (2016th ed.).
- Kemenkes RI. (2018). *Pengawasan Mutu Pangan* (1st ed.). Badan Pengembangan dan Pemberdayaan Sumber Daya Manusia Kesehatan. http://bppsdmk.kemkes.go.id/pusdiksdmk/wp-content/uploads/2018/05/Pengawasan-Mutu-Pangan_SC.pdf
- Kusumastuty, I., Harti, L. B., & Misrina, S. A. (2016). Perbedaan Kandungan Serat Pangan Pada Makanan Siap Saji Khas Indonesia Yang Dianalisis Dengan Menggunakan Nutrisurvey Dan Enzimatik Gravimetri. *Majalah Kesehatan FKUB*, 3, 196–203. <https://majalahfk.ub.ac.id/index.php/mkfkub/article/view/111/100>
- Kuswandi, Octriana, L., Kuswara, B., & Nofiarli. (2017). Eksplorasi, Karakterisasi, dan Evaluasi Idiotipe Alpukat di Kabupaten Solok. *Jurnal Agroteknologi Universitas Andalas*, 1, 26–29. <http://www.jagur.faperta.unand.ac.id/>
- Lamusu, D. (2018). Uji Organoleptik Jalangkote Ubi Jalar Ungu (*Ipomoea batatas L*) Sebagai Upaya Diversifikasi Pangan. *Jurnal Pengolahan Pangan*, 3, 9–15. <https://pengolahanpangan.jurnalpertanianunisapalu.com/index.php/pangan/article/download/7/8>
- Manurung, H. P., & Suriono, H. (2020). Pengaruh Kualitas Pelayanan, Inovasi Dan Cita Rasa Makanan Terhadap Kepuasan Pengunjung Wisata Danau Buatan Kelapa Gading Kisaran. *Prosiding Seminar Nasional Multidisiplin Ilmu Universitas Asahan Ke-4 Tahun 2020*, 487–500. <http://www.jurnal.una.ac.id/index.php/semnasm>
- udi/article/view/1563/1279#
- Muzakar, & Audina, B. (2018). Pengaruh Pemberian Jus Alpukat (*Persea gratissima*) Terhadap Perubahan Konstipasi Pada Lansia di Panti Tresna Werdha Teratai Kota Palembang Tahun 2016. *PUBLIKASI PENELITIAN TERAPAN DAN KEBIJAKAN*, 1, 30–35. <http://ejournal.sumselprov.go.id>
- Noor, R. (2017). *Faktor-Faktor Kepuasan Pasien Dengan Sisa Makanan Pada Pelayanan Gizi Di Ruang Rawat Inap Rumah Sakit Islam Arafah Rembang* [Universitas Muhammadiyah Semarang]. <http://repository.unimus.ac.id/id/eprint/527>
- Novalinda, D. A. (2017). Snack Bar Tepung Beras Hitam Dan Tepung Ampas Tahu Sebagai Alternatif Snack Tinggi Serat [Poltekkes Kemenkes Semarang]. http://repository.poltekkes-smg.ac.id/index.php?p=show_detail&id=14255&keywords=ampas+tahu
- Nugraha, Setya, D., & Muhlisin, A. (2018). Gambaran Karakteristik Responden, Riwayat Penyakit Yang Menyertai Dan Jenis Penyakit Reumatik Pada Lansia Di Wilayah Kerja Puskesmas Kecamatan Bungkal Kabupaten Ponorogo [Universitas Muhammadiyah Surakarta]. <http://eprints.ums.ac.id/60204/>
- Nuraini, D. N. (2017). *Pro-Kontra Aneka Minuman Bagi Kesehatan*. Penerbit Gava Media.
- Nurjanah, Jacob, A. M., Hidayat, T., & Chrystiawan, R. (2018). Perubahan Komponen Serat Rumput Laut *Caulerpa sp.* (Dari Tual, Maluku) Akibat Proses Perebusan. *Jurnal Ilmu Dan Teknologi Kelautan Tropis*, 10, 35–48. <http://journal.ipb.ac.id/index.php/jurnalikt/article/view/21545>
- Nurman, M., & Afifah, A. (2019). Studi Perbandingan Jus Apel Dan Jus Alpukat Terhadap Penurunan Kadar Kolesterol Pada Orang Yang Mengalami Hiperkolesterolemia Di Wilayah Kerja Puskesmas Bangkinang Kota. *Jurnal Ners*, 3, 114–120. <http://journal.universitaspahlawan.ac.id/index.php/ners>
- Pramudito, Pramudk, Fuskhah, Eny, & Sumarsono. (2018). Efektivitas Penambahan Hormon Auksin

- (Iba) Dan Sitokinin (Bap) Terhadap Sambung Pucuk Alpukat (*Persea americana Mill.*) [Universitas Diponegoro]. <http://eprints.undip.ac.id/61454/>
- Purhadi, Purnanto, N. T., & Sutrisno. (2019). Efektivitas Pemberian Jus Buah Alpukat Terhadap Penurunan Kadar Kolesterol Di Desa Ngabenrejo Kecamatan Grobogan Kabupaten Grobogan. *4*, 39–42.
- Purwanto, Y. A., & Effendi, R. N. (2016). Penggunaan Asam Askorbat dan Lidah Buaya untuk Menghambat Pencoklatan pada Buah Potong Apel Malang. *Jurnal Keteknik Pertanian*, *4*, 203–210. <https://doi.org/10.19028/jtep.04.2.203-210>
- Rahman, S. (2016). Studi Pendahuluan Pengaruh Alpukat Terhadap Profil Lemak di Poli Penyakit Dalam Klinik Iman. *Buletin Farmatera*, *1*, 1–9.
- Rantika, N., & Rusdiana, T. (2018). Artikel Tinjauan: Penggunaan Dan Pengembangan Dietary Fiber. *Farmaka*, *16*. <http://jurnal.unpad.ac.id/farmaka/article/download/17790/pdf>
- Risyad, A., Permadani, L. R., & Siswarni, M. Z. (2016). Ekstraksi Minyak Dari Biji Alpukat (*Persea americana Mill*) Menggunakan Pelarut N-Heptana. *Jurnal Teknik Kimia USU*, *5*, 34–39. resi.levi.permadani@gmail.com
- Santoso, A. (2011). Serat Pangan (Dietary Fiber) Dan Manfaatnya Bagi Kesehatan. *Magistra*, 35–40. <http://fmipa.umri.ac.id/wp-content/uploads/2016/09/Pinki-A-Serat-dan-manfaatnya-bg-kesehatan-74-129-1-SM.pdf>
- Sariningsih, E., & Srimati, M. (2018). Formulasi Jus Alpukat Dengan Air Kelapa Muda Yang Berpotensi Menurunkan Hipertensi. *Nutri-Sains*, *2*. <https://pdfs.semanticscholar.org/fff4/ce390d03b7f2c48c56580cebf719a8f3eec5.pdf>
- Sitompul, D. I. S. (2019). *Pengaruh Jus Buah Apel Terhadap Ph Saliva Pada Siswa/i Kelas VII Smp Swasta Taman Siswa Kecamatan Sawit Seberang Kabupaten Langkat* [Poltekkes Kemenkes Medan]. <http://poltekkes.aplikasi-akademik.com/xmlui/handle/123456789/725>
- Susanto, D. B. (2019). *Jus Dahsyat Tumpas Penyakit, Sehat & Awet Muda*. Cemerlang Publishing. cemerlang_yk@yahoo.co.id
- Susilowati, E. (2010). *Kajian Aktivitas Antioksidan, Serat Pangan, Dan Kadar Amilosa Pada Nasi Yang Disubstitusi Dengan Ubi Jalar (Ipomoea batatas L.) Sebagai Bahan Makanan Pokok* [Universitas Sebelsa Maret]. <https://core.ac.uk/download/pdf/12352299.pdf>
- Sutopo, D. (2019). *Functional Food* (J. Suzana (ed.)). PT Elex Media Komputindo. elex@elexmedia.id
- Tim Karya Tani Mandiri. (2019). *Rahasia Sukses Bertanam Alpukat* (1st ed.). Nuansa Aulia. <http://www.nuansaaulia.com>
- Tim Saraswati. (2019). *Jus Super untuk Perempuan Aktif* (I. Hardiman (ed.); 1st ed.). PT Gramedia Pustaka Utama.
- TKPI. (2017). *Tabel Komposisi Pangan Indonesia*. Kementerian Kesehatan RI.
- USDA. (2019). *Food Data Central*. fdc.nal.usda.gov.
- Utama, L. J., & Yunita, L. (2019). Formulasi, Uji Daya Terima dan Analisis Kandungan Gizi Es Krim Pangan Fungsional Tinggi Protein dan Serat Berbasis Beras Hitam, Kacang Merah dan Kelor. *Prosiding Semnas Sanitasi*, 78–90. juntra8686@gmail.com
- Violita, Lady, & Purba, R. (2021). Uji Organoleptik Dan Analisis Kandungan Gizi Cookies Substitusi Tepung Biji Alpukat. *Journal Nutrition and Culinary*, *1*. <https://jurnal.unimed.ac.id/2012/index.php/JNC/article/view/26854/16565>
- Wahyuningtias, D. (2010). Uji Organoleptik Hasil Jadi Kue Menggunakan Bahan Non Instant Dan Instant. *BINUS BUSINESS REVIEW*, *1*, 116–125. <https://journal.binus.ac.id/index.php/BBR/article/download/1060/1307>
- Waruwu, P. S. (2020). Pengaruh Pemberian Alpukat Terhadap Kadar Kolesterol Total Darah Pada Mahaiswa/i Obesitas Di Fakultas Kedokteran Universitas HKBP Nommensen Medan Tahun 2019. *Repository Universitas HKBP Nommensen*. <http://repository.uhn.ac.id/handle/123456789/4012>
- Wati, W. A. A., Jaelani, M., & Sulistyowati, E. (2019).

- Pengaruh Smoothies Kombinasi Aneka Buah Dan Sayur Terhadap Penurunan Kadar Kolesterol Total. *Jurnal Riset Gizi*, 7, 1–8.
- Widia, F. (2017). Perbedaan Pengaruh Pemberian Jus Apel Hijau Dengan Jus Apel Merah Terhadap Kadar Kolesterol Total Penderita Hiperkolesterolemia Di Laboratorium Kesehatan Padang Tahun 2017. Politeknik Kesehatan Kemenkes Padang.
- Widowati, E., Utami, R., Amanto, B. S., Mahadjoene, E., & Putri, A. A. (2020). Pengaruh Kombinasi Enzim Pektinesterase dan Poligalakturonase terhadap Klarifikasi Sari Buah Apel Varietas Manalagi. *AgriTECH*, 4, 290–298. <https://doi.org/http://doi.org/10.22146/agritech.43165>
- Widyaningrum, H. (2019). *Kitab Tanaman Obat Nusantara* (A. Rahmat (ed.); 2nd ed.). Media Pressindo. www.media-pressindo.com
- Wijayanti, Yulina, & Elliya, R. (2014). Pengaruh Pemberian Jus Alpukat (*Persea Americana Mill*) Terhadap Penurunan Kolestrol Tikus Putih Jantan (*Rattus novergicus*) Galur Wistar Kota Bandar Lampung Tahun 2014. *Jurnal Kesehatan Holistik*, 8, 147–152.
- Winarno, E. (2018). *Efektifitas Jus Buah Naga Dan Jus Buah Alpukat Terhadap Penurunan Gula Darah Pada Penderita Diabetes Melitus Di Puskesmas Krompol Kecamatan Bringin Kabupaten Ngawi* [Stikes Bhakti Husada Mulia Madiun]. <http://repository.stikes-bhm.ac.id/id/eprint/160>
- Zaddana, C., Almasyhuri, & Shalatin, R. A. (2020). Selai Lembaran Kombinasi Apel (*Malus sylvestris (L.) Mill.*) Dan Teh Hijau (*Camellia sinensis L.*) Sebagai Pangan Fungsional (Sheet jam based on apple and green tea as a functional food). *Jurnal AcTion: Aceh Nutrition Journal*, 5, 87–97. <http://dx.doi.org/10.30867/action.v5i1.267>
- Zai, K., Sidabalok, I., & Asnurita. (2021). Karakteristik Mutu Flakes Dengan Substitusi Tepung Biji Alpukat (*Persea Americana Mill*) Terhadap Tepung Terigu. *Jurnal Pionir LPPM Universitas Asahan*, 7, 10–20. <http://jurnal.una.ac.id/index.php/pionir/article/view/1821/1497>
- Zukhri, S., Meinisa, T. I., & Sulistyowati, A. D. (2018). Perbedaan Pengaruh Jus Jambu Biji Dengan Jus Apel Hijau Terhadap Penurunan Kadar Kolesterol Darah. *Motorik*, 13, 213.
