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Acceptance Test and Nutritional Analysis of Aloe Vera Gel a Combination of Rome Beauty Apples as a Potential Treatment to Reduce Cancer Risk

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Abstract – **Aloe vera and Rome Beauty apples have antioxidants, one of which is quercetin, to reduce the risk of cancer and inflammation, but they are less popular as functional foods because their flavors are less desirable. This study aims to determine the acceptability and analyze the nutritional content of aloe vera jelly combined with Rome Beauty apples. This study used an experimental design. The panelists used in this study were 30 people who were semi-trained panelists. The results of the hedonic test on color parameters showed there was a significant difference ($p<0.05$). The results of the Exponential Comparison Method (MPE) showed that A3 agar was the selected formula. The results of the nutritional content of the selected formula (A3) per 80 gram were energy 64 kcal, protein 1.66 g, fat 0.85 g, carbohydrate 12.32 g, water content 64.89 g, and ash content 0.27 g. The results of the quantitative test showed that the IC50 value of selected formula (A3) was 43,440 ppm and quercetin level 1498.4 mg/80g. It can be concluded that the selected formula has the potential to be a healthy snack to reduce cancer if it is supported by the consumption of other foods that are high in antioxidants.**

Keywords – *Agar, Apple, Aloe Vera, Quercetin*.

INTRODUCTION

Degenerative diseases or non-communicable diseases (NCDs) are diseases that cannot be transmitted from one person to another [1]. Based on the Ministry of Health's Data and Information Center, (2012), as many as 70% of the world's population will die due to NCDs such as cancer, coronary heart disease, stroke and diabetes mellitus. Cancer is the seventh leading cause of death in Indonesia and the second leading cause of death in the world. The number of cancer sufferers always increases every year. Changes in people's lifestyles in the modern era, such as consuming food with unbalanced nutrition, smoking and drinking alcoholic beverages, as well as deteriorating environmental conditions, have caused a decrease in the production of compounds that are useful for maintaining the body's condition, namely natural antioxidants that are used to neutralize free radicals formed as a result. air pollution, radiation sources, dangerous chemicals, and the formation of other free radicals [2].

Free radicals are defined as atoms or molecules with one or more unpaired electrons, are unstable, short-lived and highly reactive, binding electron molecules around them, causing potential damage to body cells which leads to increased oxidative stress. Cancer is formed through the stage of changing normal cells into cancer cells due to mutations caused by various factors, including factors that cannot be controlled and can be controlled. Factors that cannot be controlled are age, gender and genetics. Meanwhile, factors that can be controlled are unhealthy lifestyles, including consuming foods containing carcinogens, fatty foods, alcoholic drinks, smoking habits, excessive exposure to ultraviolet and radioactive rays, and air pollution. The risk of developing cancer can be reduced by consuming sufficient amounts of antioxidants. One example of food that contains antioxidants is aloe vera and apples [3].

Aloe vera contains flavonoid compounds which have the potential to act as antioxidants, one of which is 94.80 mg/kg quercetin [4]. This antioxidant is useful

for preventing cancer and other degenerative diseases. Apart from aloe vera, apples also contain flavonoid compounds, especially quercetin (flavonol group) which is a source of antioxidants. In 100 grams of apples, there are around 4.42 mg of quercetin aglycone and 13.2 mg of quercetin glycosides. The quercetin content in apples is influenced by differences in varieties, growing conditions, plant nutrition, storage and processing. Based on research conducted by Cempaka et al., (2014), compared with 3 types of apples (Manalagi, Fuji, Red Delicious), the highest quercetin levels were found in Rome Beauty apples at 477.96 mg/kg [5].

Aloe vera and Rome Beauty apples are easy to find in Indonesia. Aloe vera is widely used as an ornamental plant, cosmetics and medicine for hair health, but until now it has not been popular as a functional food to maintain health and its taste is not popular with the public. Meanwhile, Rome Beauty apples are starting to lose their popularity along with the large number of imported apples entering Indonesia, such as Fuji, Washington and Golden Delicious. The better taste and larger size mean that local apples are unable to compete in the market.

Based on the background above, researchers are interested in making a healthy snack, namely aloe vera leaf jelly combined with apples as an effort to reduce the risk of cancer. Snacks are small portions of food eaten between two meals. Healthy snacks are snacks that are nutritious, low in calories and high in fiber.

METHOD

Design and Data Collection

This research was carried out for 6 months from September 2022 to February 2023. The place used to conduct this research was the organoleptic laboratory of the Nutrition study program, Faculty of Science and Technology, Al Azhar University and the nutritional content test was carried out in the Jakarta Health Lab laboratory and the antioxidant quercetin content test was carried out in the Laboratory of the Chemistry Department, Faculty of Medicine, University of Indonesia. The research design used is an experimental design.

Instrument and Statistical Analysis

The tools used in this research were divided into three, namely tools for making jelly, tools for testing acceptability, and tools for analyzing quercetin and nutrient content. Tools for making jelly include knives, cutting boards, pans, blenders, glasses, tablespoons, containers and digital scales. Tools for the acceptability test are hedonic and hedonic quality test forms as well as writing instruments. Tools for analyzing quercetin and nutrient content include spectrophotometry, oven, Kjeldahl flask, desiccator, digestion apparatus, filter paper, distillation apparatus, scales, fat flask, muffle, cup and porcelain saucer. The materials used in this research consist of main materials, supporting materials and chemicals. The main ingredients are gelatin flour, aloe vera and super grade A Rome Beauty apples. Supporting ingredients are water, egg yolk, skim milk and granulated sugar. The chemicals are H_2SO_4, Folin C, HCL, NaOH, boric acid, and N-Hexane.

In this research there were two stages. The first stage is preliminary research and the second stage is main research. Preliminary research is to find the formula for the best amount of aloe vera and apple smoothies to be added to the main ingredients for making gelatin. The results of this preliminary research are that the best amount of aloe vera and apple smoothies of 150 grams provides the desired gelatinous consistency similar to the gelatinous consistency on the market. After obtaining the number of selected smoothies, then they were made into formulations with 3 different treatments. Each treatment has a comparison described in the following table.

Table 1. Treatment Details

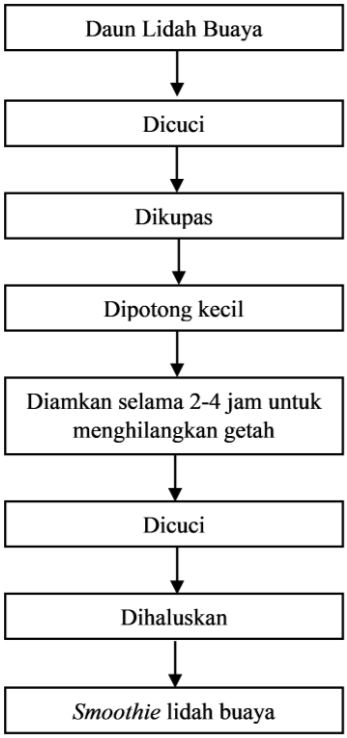
Treatment	Amount		
	Agar-Agar Flour (gram)	Aloe Vera Leaves (gram)	Apples (gram)
A1	7,8	100	50
A2	7,8	75	75
A3	7,8	50	100

The main research consists of making agar-agar with three formulations, organoleptic testing, determining the selected formula and analyzing the content of nutrients and quercetin. The following is a comparison of the doses of ingredients in each treatment in the manufacture of aloe vera jelly combined with apples.

Table 2. Composition Of Aloe Vera Gel Formula With Apple Fruit Combination

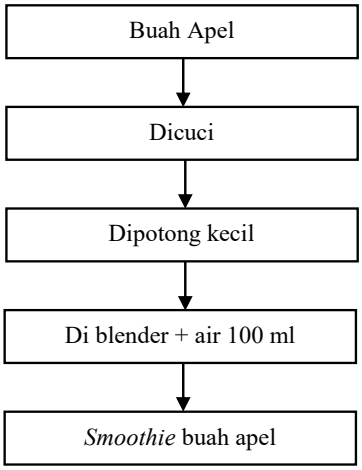
Material	Treatment		
	A1	A2	A3
Agar-Agar Flour (g)	7,8	7,8	7,8
Aloe Vera Smoothie (g)	100	75	50
Apple Fruit Smoothie (g)	50	75	100
Granulated Sugar (g)	120	120	120
Water (ml)	450	450	450
Skim Milk (ml)	300	300	300
Egg Yolk (grain)	2	2	2

The process of making an aloe vera leaf smoothie can be seen in the picture below.



Picture 1. Process of Making Aloe Vera Smoothie

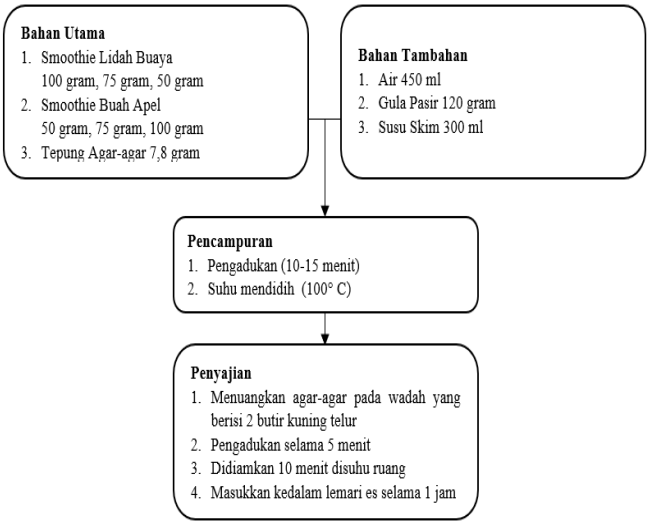
The process of making apple fruit smoothies can be seen in the picture below.



Picture 2. Process of Making Apple Smoothie

In making aloe vera jelly combined with apples, it is necessary to determine the dosage of each main and additional ingredient in a certain ratio, so that the resulting jelly suits the tastes of the panelists and consumers. In addition, the materials selected in this study were of very good quality, such as no rot, no change in color, taste and aroma. Thus, the resulting agar-agar is of very good nutritional quality as well.

The process of making jelly can be seen in the picture below.



Picture 3. The Process of Making Aloe Vera Jelly Combined With Apples

Next, an organoleptic test is carried out, namely a test or assessment method that uses human sensory organs by using a hedonic or preference test which states whether the panelists like or dislike the agar (product) and the hedonic quality test. Organoleptic tests in this study used semi-trained panelists of 30 students at Al Azhar University Indonesia with the condition that they were healthy, not tired, not color blind, voluntary, and had no allergies.

The next step is to determine the selected formula. The selected formula is the formula with the highest average percentage of overall acceptance. Determination of the selected formula was carried out based on the organoleptic test, namely the hedonic.test by means of exponential comparisons. The exponential comparison method is one of the determinations of the selected formula in food product development research or food nutrition. Determination of the formula based on the weights and parameters desired by the researcher.

After obtaining the selected formula, analysis of nutrient content was carried out. The nutrient content analyzed is as follows:

1. Total protein (SNI 01-2891-1992 (kjehdahl))
2. Total fat (SNI 01-2891-1992 (gravimetry))
3. Total carbohydrates (by difference)
4. Moisture content (SNI 01-2891-1992 (gravimetry))
5. Ash content (SNI 01-2891-1992 (gravimetry))
6. Quercetin levels (Spectrophotometry)

Processing data from research results from acceptability tests and quercetin content tests electronically using SPSS version 26 software with the Kruskal Wallis statistical test because the data is not normally distributed, if the probability value is $p < 0.05$ then further analysis is carried out using Mann Whitney U.

RESULT AND DISCUSSIONS

Agar-Agar Organoleptic Test

The organoleptic test in this study was carried out by testing 3 samples, namely formula 1 (A1), formula 2 (A2), and formula 3 (A3) which were derived from research products. The results of the assessment of the organoleptic test on the three samples can be seen in the following table.

Table 3. Agar-Agar Hedonic Test Results

Parameter	The mean value of the sample hedonic test		
	A1	A2	A3
Color	3.83 ± 0.76a	3.83 ± 0.76a	3.78 ± 0.87a
Scent	3.08 ± 0.83a	3.20 ± 0.76a	3.17 ± 0.80a
Flavor	3.72 ± 0.76a	3.77 ± 0.70a	3.72 ± 0.98a
Texture	3.80 ± 0.66a	3.52 ± 0.85a	3.72 ± 0.67a
Whole	3.73 ± 0.69a	3.73 ± 0.71a	3.78 ± 0.74a

Note: ab = similar letter notation means there is no significant difference at the level of the Mann-Whitney test which has a value of 5%

Based on the table above, the results of the Kruskall Wallis test on the parameters of color, aroma, taste, texture and overall showed $p > 0.05$ so there was no significant difference in the treatment (A1, A2, and A3) of the color, aroma, taste and texture of the agar. aloe vera combination with apples. The color, taste, aroma and texture of food are important factors that must be considered in the art of serving food so that the food can provide and arouse the appetite of those who enjoy it. The addition of aloe vera and apples in the development of this jelly makes the jelly more attractive so that it affects the acceptability and level of liking. In addition, the addition of aloe vera and apples can increase the nutritional content of the jelly so that it is beneficial for health.

Table 4. Results of Agar-Agar Hedonic Quality Test

Parameter	The mean value of the sample hedonic quality test		
	A1	A2	A3
Color	4.10 ± 0.44b	3.70 ± 0.70a	3.43 ± 0.83a
Scent	2.77 ± 0.93a	2.87 ± 0.93a	3.02 ± 0.87a
Flavor	3.70 ± 0.65a	3.90 ± 0.73a	3.95 ± 0.79a
Texture	3.12 ± 0.90a	3.05 ± 0.93a	3.13 ± 0.93a

Note: ab = similar letter notation means there is no significant difference at the level of the Mann-Whitney test which has a value of 5%

Based on the table above, the results of the Kruskall Wallis test on the aroma, taste and texture parameters showed $p > 0.05$ so there was no significant difference in the treatment (A1, A2, and A3) of the aroma, taste and texture of the aloe vera jelly combined with apples , while the color parameter showed $p < 0.05$ so that there were significant differences in the treatment (A1, A2, and A3) of the color of the aloe vera agar combined with apples. To see which groups were different, further tests were carried out with the Mann-Whitney test.

The results of the Mann-Whitney test showed that the panelist's impression of the color of the aloe vera mixed with apples was not significantly different ($p > 0.05$) in A2 and A3. However, there were significant differences ($p < 0.05$) in A1 and A2, as well as A1 and A3 in the color of the aloe vera agar combined with apples. The color produced by agar-agar is influenced by the addition of apples, the color of the apple skin is reddish-green and the flesh is yellowish. The more concentration of apples in the agar, the more yellow the color of the agar will be [6]. The aroma caused by a food and beverage product is the main attraction for the recipient. The addition of the ingredients in this development product provides an aroma effect that is acceptable to the panelists. The more apples added, the dominant aroma produced is typical of apples [7].

The resulting taste is also influenced by the ingredients in this development product. According to Haryuning et al., (2019) the more apples added, the resulting sweet and slightly sour taste of apples [7]. The presence of granulated sugar functions to give flavor and flavor to the resulting jelly. The texture produced in a food product is one of the physical properties that can determine the taste of food. The texture is influenced by the ingredients in the development product which can produce a gelatinous texture. The presence of sugar and egg yolk can affect the texture of the development product. The more granulated sugar you add, the denser the texture of the jelly will be [8].

Selected Formula Determination

Determination of the selected formula using the Exponential Comparison Method (MPE). The exponential comparison method is one of the methods of the Decision Support System (DSS) which is used to determine the priority order of alternative decisions with multiple criteria (Multiple Criteria). This method is carried out by weighting (in percentage) on the results of the hedonic test analysis of agar in accordance with the degree of importance or superior aspects of the agar product.[9]. Determination of the weight of agar is as follows: color (20%), aroma (10%), taste (30%), and texture (40%). This means that texture and taste are used as advantages in this research agar. Furthermore, the total score is obtained by adding the multiplication results between the weights and the rankings for each parameter. The best agar has the highest organoleptic properties. The results of the Exponential Comparison Method (MPE) showed that A3 agar had the highest total score with a score of 33%, so A3 agar was the chosen formula in this study. Formula A3 is jelly which has a composition of 50 grams of aloe vera smoothie and 100 grams of apple smoothie.

Analysis of Nutrient Content

The results of the analysis of nutrient content include total energy, protein, fat, carbohydrates, moisture content and ash content. Nutritional content analysis was carried out on the selected A3 based on exponential comparison calculations. The results of the analysis of nutrient content in A3 can be seen in the following table.

Nutritional Substances	Content
Total Energy (kcal)	80
Total Protein(g)	2.08
Total Fat (g)	1.06
Carbs (g)	15,40
Moisture Content (g)	81,11
Ash Content (g)	0.34

Table 5. Results of Analysis of The Nutritional Content of Agar-Agar A3 (100 Grams)

Based on the table above, the results of the analysis of the total energy content in A3 are 80 kcal. The energy value can be obtained from the carbohydrates, fats and proteins contained in the jelly. Energy can be obtained from carbohydrates, proteins, and fats contained in foodstuffs that are stored in the body and energy for humans is used to grow and develop.

The results of the analysis of the A3 protein content were 2.08 g/100 g. Protein is one of the nutrients that is needed by the body which is used in cell formation and cell metabolism. Fulfillment of high protein nutrition in children and adolescents is needed to help their growth and development. However, in some circumstances, such as in patients with kidney failure, it is very necessary to pay attention to the restriction in giving protein, so that the fulfillment of protein can be given in low amounts [10].

The results of the analysis of the fat content of A3 were 1.06 g/100 g. Fat functions as a shortening and influences the texture so that the resulting jelly becomes softer and fat can improve physical structures such as development, texture softness, and aroma.[11]. The results of the analysis of the A3 carbohydrate content were 15.40 g/100 g. Carbohydrates are the main source of calories which play a role in determining the characteristics of food ingredients such as color, taste and texture.

The results of the analysis of the water content of A3 were 81.11 g/100 g. Moisture content is a characteristic that greatly influences food ingredients, especially the appearance, texture, and taste of food. High water content makes it easy for bacteria, mold and yeast to grow, so there will be changes in food ingredients. Moisture content is one of the reasons in the processing of food ingredients and greatly affects the quality of food ingredients. Water is often reduced by evaporation, thickening and drying. High water content in foodstuffs will facilitate the occurrence of chemical and biochemical changes, as well as the growth of microorganisms during the storage period [12].

The results of the analysis of the ash content of A3 were 0.34 g/100 g. Ash content is an element that forms extract materials in the absence of nitrogen and can affect the composition of organic matter. Ash content is also a measure used to determine the total amount of minerals present in foodstuffs. High and low ash content in food products is strongly influenced by the method of cooking process, besides that, ash content also correlates with the mineral content in these food products [10].

Contribution of Agar-Agar Nutrient Content to Common ALG)

Nutrition Label Reference (ALG) is a reference for the inclusion of information on nutritional content on food product labels. ALG is used to calculate the percentage of Adequacy of Nutrition (RDA) based on the average energy adequacy of the Indonesian population of 2150

kcal/person/day. The contribution of the nutrient content of A3 agar per serving size to the general Nutrition Label Reference (ALG) can be seen in the following table.

Table 6. Results of The Analysis of Nutritional Content of Agar-Agar A3 Per Serving (80 Grams)

Nutritional Substances	Content	%AKG
Total Energy (kcal)	64	29%
Total Protein(g)	1.66	28%
Total Fat (g)	0.85	13%
Carbs (g)	12,32	38%
Moisture Content (g)	64,89	-
Ash Content (g)	0.27	-

The weight of agar-agar per serving is 80 grams. Determination of the weight of agar-agar per serving is based on BPOM regulation number 26 of 2021 and serving sizes of jelly on the market [13]. The A3 agar-agar product was developed to be an alternative healthy snack that has the potential to reduce cancer, namely being able to fulfill 10% of the snack's contribution to the total daily nutritional adequacy rate. Based on the table above, A3 agar-agar per serving provides 64 kcal of energy or 29% of the daily nutritional needs. Agar-agar A3 per serving provides 1.66 g of protein or 28% of the daily nutritional needs. This A3 product has a protein content that is higher than 80 g of aloe vera jelly on the market because the protein content in the jelly is 1 g. The protein content in the A3 agar product was influenced by the addition of food sources of protein, namely egg yolks and skim milk. However, the protein content in the research product was lower when compared to the protein content in egg yolks and skim milk before processing. The protein content in egg yolk is 15.32 g/100 g, while the protein content in skim milk is 3.43 g/100 ml.[14]. The decrease in protein content in processed agar was due to heating at high temperatures. The higher the temperature used, the lower the protein content in the food [15].

Agar-agar A3 per serving dose contributes 0.85 g of fat or 13% of the daily nutritional needs. The fat content in A3 agar is higher than the fat content in 80 g of aloe vera jelly on the market, which is 0 g. The fat content in product A3 is influenced by the addition of egg yolks in the manufacture of agar. Egg yolk has a fat content of 31.06 g/100 g. In general, the basic principle is to fulfill a balanced fat intake, which is 20-25% of the total nutritional needs [10].

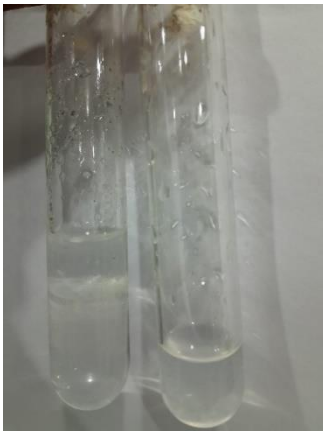
A3 agar-agar per serving size contributes 12.32 g of carbohydrates or 38% of the daily nutritional needs. The carbohydrate content in A3 is lower than the carbohydrate content in 80 g of aloe vera jelly on the market. The water content in A3 agar per serving size is 64.89 g. The water content in product A3 is lower than the water content in pudding in the research of Wadhani et al., (2021), which is as much as 80.82%/2 g [10]. The water content in product A3 is affected by the presence of 50 grams of aloe vera which contains 49.6 grams of water[16]. While the water content in 100 grams of apples is 86.65%.[17]. In addition, the water content in product A3 is affected by the addition of water and skim milk. Consumption of Agar-agar A3 cannot meet 10% of energy needs from snacks in a day.

The ash content of A3 agar in one portion is 0.27 g. The ash content of the A3 agar product is lower than the ash content of pudding in the research of Wadhani et al., (2021), which is 2.35%. High and low ash content in food products is strongly influenced by the method of cooking process, besides that, ash content also correlates with the mineral content in these food products [10].

Quercetin Content Analysis

Qualitative Analysis

Qualitative analysis was carried out to prove the presence of quercetin in the research product. The formula being analyzed is formula 3 which was chosen based on the results of the exponential comparison. The results of qualitative analysis on A3 can be seen in the following figure.



Picture 4. Quercetin Qualitative Test Results

Based on the picture above, it can be seen that the tube on the left is the sample, and the right is the control so it can be concluded that in the agar sample there are flavonoid compounds indicated by the green color on the top layer. [18]

Quantitative Analysis

The quantitative analysis of quercetin was carried out on agar (A3) including antioxidant activity and quercetin levels. Antioxidant activity testing was carried out to determine the IC50 value of the samples.

Quantitative Analysis	Results
Sample antioxidant activity (IC50 (ppm))	543.0
Quercetin levels (mg/g)	18.73

The results of the quantitative analysis of quercetin on A3 agar can be seen in the following table.

Table 7. Results of Quantitative Analysis of Quercetin Per 1 Gram of Agar-Agar (A3)

Based on the table above, it is known from the results of quantitative analysis of quercetin agar A3 in 1 gram, that there is antioxidant activity with an IC50 value of 543 ppm and a quercetin level of 18.73 mg/g. The results of the quantitative analysis of quercetin per serving can be seen in the following table.

Table 8. Results of Quantitative Analysis of Quercetin Per Serving of Agar-Agar (A3)

Quantitative Analysis	Results	
	80 grams	100 grams
Sample antioxidant activity (IC50 (ppm))	43440,1	54300,1
Quercetin levels (mg/g)	1498,4	1873

Based on the above table, in 80 grams of agar there is antioxidant activity with an IC50 value of 43440 ppm and in 100 grams of agar of 54300 ppm. IC50 is the concentration value of the extract which is able to inhibit the activity of the oxidation process by 50%. Classification of antioxidants is divided into 5, namely <50 ppm (very strong), 50-100 ppm (strong), 100-150 ppm (moderate), 150-200 ppm (weak) and >200 ppm is very weak [19]. The antioxidant activity per serving of agar is still very weak because the IC50 value of the extract is greater than 200 ppm. Antioxidant activity in fresh products is higher than processed products. This is evidenced by Wahyuni (2016) that the crude extract of fresh apples and has higher antioxidant activity is indicated by a low IC50 value, while the crude extract of apple juice has a high IC50 value of > 2000 ppm. This can happen because when cutting apples and making juice with a blender, the apples experience oxidation [20].

The very low antioxidant activity is also due to the fact that the sample has undergone various processing processes. Besides being able to provide physical changes, the processing process will also change the chemical composition of food ingredients [20]. Flavonoid compounds are unstable to changes in the effects of oxidation, light, and chemical changes, so when they are oxidized, their structure will change and their function as an active ingredient will decrease [5]. The role of antioxidants is very important in neutralizing and destroying free radicals that can cause cell damage and also damage biomolecules, such as DNA, proteins and lipoproteins in the body which can eventually trigger degenerative diseases such as cancer, heart disease, arthritis, cataracts, diabetes and liver disease. This degenerative disease is caused because the antioxidants in the body are unable to neutralize the increased concentration of free radicals. To avoid this, additional antioxidants from outside or exogenous antioxidants are needed, such as vitamin E, vitamin C, as well as various types of vegetables and fruits [21].

The results of the analysis of quercetin levels in 80 grams of agar were found to be 1498.4 mg/80g and in 100 grams it was known to be 1873 mg/100g. The quercetin content in agar was higher when compared to the quercetin content of fresh Rome Beauty apples in the research of Cempaka et al., (2014) which was 0.48 mg/g and the quercetin content of fresh aloe vera in the research of Wariyah et al., (2014) which is equal to 0.09 mg/g. This might be due to the different characteristics of the Rome Beauty apple and the aloe vera used. The quercetin content is affected by differences in fruit varieties, growing conditions, plant nutrition, storage and processing [5][4]. Consumption of quercetin has various positive impacts on health, one of which is as an anti-inflammatory. Quercetin can help reduce inflammation if consumed 300-500 mg/day. Consumption of aloe vera jelly combined with apples can potentially help reduce inflammation when supported with other high-antioxidant foods/drinks. Quercetin needs are not only met from apples and aloe vera, but can be met from other food ingredients, for example onions, green tea, black tea, and red wine [21].

CONCLUSION

Based on the research results, it can be concluded that:

- The results of the preference level test showed no significant difference ($p > 0.05$) in the treatments (A1, A2, and A3) on the color, aroma, taste and texture of the agar. The results of the hedonic quality test showed that there was no significant difference ($p > 0.05$) in the

treatments (A1, A2, and A3) on the aroma, taste and texture of the agar, while there was no significant difference in the color parameter ($p > 0, 05$) in A2 and A3, but there were significant differences ($p < 0.05$) in A1 and A2, as well as A1 and A3 in the color of the agar. The more concentration of apples in the agar, the more yellow the color of the agar will be.

- The results of determining the selected formula using the Exponential Comparison Method (MPE) showed that A3 agar had the highest total score of 33%, so A3 agar was the chosen formula.
- The results of the analysis of the nutritional content of A3 agar per serving (80 g) were 64 kcal of energy, 1.66 g of protein, 0.85 g of fat, 12.32 g of carbohydrates, 64.89 g of water content , and ash content of 0.27 g. The protein content in A3 is higher than the protein content in 80 g of aloe vera jelly on the market, which is 1 g. The fat content in A3 agar is higher than the fat content in 80 g of aloe vera jelly on the market, which is 0 g.
- The results of the quercetin qualitative test showed that there was quercetin in this A3 agar product which was indicated by the green color on the top layer. In the quantitative test results, the quercetin content in 80 grams of A3 agar was 1498.4 mg/80g and in 100 grams of agar was 1873 mg/100 g, but the antioxidant activity of quercetin was considered very weak, so consumption of 80 grams of agar aloe vera in combination with apples can potentially reduce cancer and inflammation when supported with other high-antioxidant foods/drinks.

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Lastly, I also don't forget to express my gratitude, especially to my parents and sister. Their trust in me kept my enthusiasm and motivation high throughout this process. This undergraduate thesis is far from perfect, but it is expected that it will be useful not only for the researcher, but also for the readers. For this reason, constructive thoughtfull suggestion and critics are welcomed.

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