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FORMULATION AND QUALITY EVALUATION OF THE PREPARATION OF COMBINATION OF TOOTHPASTE BAY LEAF EXTRACT (*Syzygium polyanthum*) AND MINT LEAVES EXTRACT (*Coleus amboinicus* L.)

Formulasi Dan Evaluasi Mutu Sediaan Pasta Gigi Kombinasi Ekstrak Daun Salam (Syzygium polyanthum) Dan Ekstrak Daun Mint (Coleus amboinicus L.*)*

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ABSTRACT

The content of flavonoid compounds, tannins, and saponins in bay leaves acts as an antibacterial. In addition, the content of terpenoid compounds, namely menthol compounds found in mint leaves have antibacterial activity. This study aimed to determine the formulation of the method of making toothpaste preparations and the results of the evaluation of the physical quality and phytochemical screening tests on toothpaste preparations. This study made 3 formulas with different variations, namely formula I (F1) bay leaf extract as much as 3 g, formula II (F2) as much as 4.5 g, and formula III (F3) as much as 6 g. This type of research is experimental. The extraction method used is maceration. Quality evaluation carried out included organoleptic tests, pH, homogeneity, foaming power, and spreadability. Phytochemical screening using a test tube. The results of the three formulas showed that the organoleptic observations were in the form of a paste, had a distinctive aroma and brown color, the pH value was 7, formulas I and II were homogeneous but formula III was not homogeneous, the average spreadability was 5 cm, and the average foam power was 4 cm. The results of the phytochemical screening test for toothpaste preparations with a combination of bay leaf and mint leaf extracts were positive for flavonoids, saponins, and tannins.

Keyword : Bay leaf; Mint Leaf; Toothpaste; Quality evaluation

INTRODUCTION

Dental and oral diseases, especially dental caries (damaged teeth) often do not receive attention from the community and the government because they are rarely life-threatening, even though dental health has an important role in efforts to improve public health status (Oktrianda, 2011). Bay leaf extract effectively inhibits the growth of Streptococcus mutans bacteria with a Minimum Inhibitory Content (MIC) value of 1% and a Minimum Killing Content (KBM) of 1.5% (Setyohadi, 2013).

According to Basic Health Research data (2013), cases of dental caries in Indonesia have increased. In 2007, sufferers of dental caries increased from 43.4% to 53.2%, an increase of 9.8%, but sufferers of dental caries increased by 5.1% from 67.2% which occurred in 2007, and experienced an increase to 72.3% which occurred in 2013.

The oral cavity contains a lot of microorganisms, in one military saliva can contain 200 million microorganisms, which consist of approximately 250 different species. In a balanced state, these microbes do not cause disease; the main bacteria in the oral cavity are Streptococci (Handayani et al., 2017).

Dental plaque is the formation of several mixtures of food debris and there are bacteria mediated by saliva which can attach to the tooth surface area (Harmely, 2011). Toothpaste with fluoride is not suitable for children under 4 years of age. This was also confirmed by the instruction from the Food and Drug Monitoring Agency (BPOM) to be able to withdraw all toothpaste products for children that still contain fluoride above 500 ppm because the use of toothpaste containing fluoride has certain side effects, it is necessary to look for alternative toothpaste formulas from natural ingredients (Harmely, 2011).

Bacteria that can cause dental caries are Streptococcus sp bacteria including Streptococcus mutans. Dental caries is a disease caused by acid-producing bacteria from Streptococcus mutans and others which can produce dental plaque because sugar undergoes metabolism and acid as a by-product, then the acid demineralizes the teeth (Handayani et al., 2017).

The definition of toothpaste issued by the American Council on Dental Therapeutics (1970) is an ingredient used with a toothbrush to clean places that cannot be reached. The recommendation is to brush your teeth twice a day, done after eating and before going to bed (Armila, 2017).

The most important ingredients in toothpaste are thickeners, abrasive cleaning agents, surfactants, humectants, flavorings, and therapeutic agents. The cleaning ability of toothpaste is provided by abrasive agents, and antibacterial qualities, provided by various substances with different abilities to inhibit the growth of germs in the oral cavity (Maldupa et al., 2012).

Bay leaves contain dyes, tannins, and antibacterial essential oils. The tannins contained are astringent. Bay leaves are useful for dealing with diseases such as diarrhea, diabetes, scabies, itching, and weak stomach. According to Sudirman's research (2014), the antimicrobial effectiveness shown by bay leaf extract has active substances in inhibiting bacterial growth such as tannins, flavonoids, and essential oils, of the three substances, is the chemical composition contained in the bay leaf extract.

Mint leaves are plants that belong to the Lamiaceae family. According to research by Tabari et al. (2012) said that mint leaf oil has strong antibacterial activity against Staphylococcus aureus bacteria. The antibacterial activity of mint leaves is due to the content of terpenoid compounds, especially menthol (Bassole & Juliani, 2012).

Based on the background that has been described, the authors want to conduct research with the title "Formulation and Quality Evaluation of Toothpaste Combination of Bay Leaf Extract (*Syzygium polyanthum*) and Mint Leaves (*Coleus amboinicus* L.)

RESEARCH METHODOLOGY

This research is a type of experimental research, using the extraction method used on bay leaves (Syzygium polyanthum) and mint leaves (Coleus amboinicus L.) using the maceration method. This study used three formulations of toothpaste preparations and physical quality tests were carried out, such as organoleptic tests, homogeneity, pH, foam formation, and spreadability.

Tools and materials

This study used tools such as spreadability test kits, sieves, stir bars, maceration vessels, glass beakers (Herma), blenders, porcelain cups, measuring cups (Herma), mortar and stampers, horn spoons, test tubes, analytical balances,

The materials used are distilled water, bay leaves, and mint leaves from Gedongan village RT 02/RW 04, Gedongan, Baki, Sukoharjo, Central Java, 70% ethanol, CaCO3, 1% FeCL3, 1 N HCL, concentrated HCL, glycerin, methylparaben, Na CMC, Mg powder, sodium lauryl sulfate, sorbitol.

Preparation of Bay Leaf Extract (*Syzygium polyanthum*)

Collection of bay leaves and mint leaves in the Sukoharjo area. The simplicia which has been in the form of fine powder is then extracted. The bay leaf powder is weighed weighing 200 grams, then mixed homogeneously then closed immediately, and stored in a container and added 70% ethanol until submerged, then mixed homogeneously then closed immediately, and stored in a room protected from sunlight for 5 days, while soaking every day stirred for 15 minutes after soaking for 5 days filtered using filter paper, then evaporated with a water bath at a temperature of 40ºC. The remaining part of the evaporation of ethanol is called concentrated extract.

Preparation of Mint Leaf Extract (*Coleus amboinicus* L.)

Collection of mint leaves and mint leaves in the Sukoharjo area. The simplicia that has been in the form of fine powder is then extracted. The bay leaf powder is weighed weighing 100 grams, then mixed homogeneously then closed immediately, and stored in a container and added 70% ethanol until submerged, then mixed homogeneously then closed immediately, and stored in a room protected from sunlight for 5 days, while soaking every day stirred for 15 minutes after soaking for 5 days filtered using filter paper, then evaporated with a water bath at a temperature of 40ºC. The remaining part of the evaporation of ethanol is called concentrated extract.

Formulation of toothpaste with a combination of bay leaf and mint leaf extract

Preparation of instant powder formulations using the composition of the ingredients as presented in Table 1.

Table 1 Formula for Toothpaste Extract of Bay Leaves and Mint Leaves (modification based on Simanjuntak (2018) and Selfyana Austin Tee and Sernita (2017)

Material	Toothpaste Formulation with Various Concentrations		
	F1 (%)	F2 (%)	F3 (%)
Bay leaf extract	5	10	15
Mint leaf extract	10	10	10
Sodium lauryl sulfate	2	2	2
$CaCO_3$	13	13	13
Na CMC	3	3	3
Sorbitol	0,3	0,3	0,3
Gliserin	10	10	10
Metil Paraben	0,3	0,3	0,3
Aquadest	ad 30	ad 30	ad 30

Weigh all the ingredients according to the formulation, then weigh 0.9 g of Na CMC in hot water for 30 minutes, then weigh 3.9 g of calcium carbonate and add 0.045 g of sorbitol, stir until homogeneous, then add bay leaf extract (*Syzygium polyanthum*) and mint leaves (*Coleus amboinicus* L.) stir until homogeneous, then add glycerin and mix with 0.09 g of methylparaben dissolved in hot water, stir until homogeneous, then add sodium lauryl sulfate

as much as 0.6 g and the remaining distilled water is stirred slowly until a paste is formed. Put it in the toothpaste container.

Organoleptic Test

The toothpaste preparation was weighed as much as 3 g and placed in a watch glass, then observed using the senses of sight, smell, taste, and touch to describe the color, smell, and shape of the toothpaste preparation. Toothpaste is said to be good if it meets the national standard for toothpaste based on SNI no. 12-3524-1995 i.e. soft, homogeneous, with no air bubbles, lumps, and separate particles.

Homogeneity Test

Toothpaste is applied evenly and thinly on the watch glass 0.5 g. Toothpaste preparations are said to be homogeneous if there is an even color and there are no particles or coarse materials that can be felt. Toothpaste is said to be good if it meets the national standard for toothpaste based on SNI no. 12-3524-1995 i.e. homogeneous, with no air bubbles, lumps, and separate particles.

Test the pH

Weigh 0.5 g gram of toothpaste, then dissolve it with 10 mL of water into a beaker glass, then dip the pH paper into the solution. The pH value according to the toothpaste quality requirements in SNI 12-3524-1995 is 4.5-10.5.

Foam formation test

Weigh as much as 0.5 g of toothpaste preparation, then dissolve it with 25 mL of water. The solution was put into a 100 mL measuring cup, then, shaken by inverting the measuring cup more than 5 times, then immediately observed the height of the foam produced. Toothpaste is considered eligible if the maximum foam height is 5 cm.

Spreadability test

Weigh 0.5 g of toothpaste, then place it in the middle of the glass, another glass is placed on top of the paste mass and left for 1 minute, then, the diameter of the paste that spreads is measured (measured by taking the average length of the diameter from several sides), then, plus additional weights of 50 g, 100 g, and 150 g in increments. Each additional load was allowed to stand for 1 minute and the diameter of the pasta that spread was recorded.

Saponin Test

Weigh 0.5 g of extract into a test tube, then add warm water and shake vertically for 10 seconds and leave for 10 seconds. Formation of foam as high as 1-10 cm and stable for not less than 10 minutes to indicate the presence of saponin compounds that are formed. Add 1 drop of 1 N HCL, the foam will not disappear.

Flavonoid Test

The extract was weighed as much as 1 g and put into a 1 mL test tube, then added 2 drops of Mg powder reagent and concentrated HCL and shaken vigorously, then samples containing flavonoid compounds will experience a very striking color change from initially green to yellow, brown, red or green.

Tannin test

The extract was weighed as much as 1 g and put into a 1 mL test tube, then 2 drops of 1% FeCl3 reagent were added and shaken vigorously. Samples containing tannin compounds will experience a striking color change to a bluish-black or green color.

RESULTS AND DISCUSSION

This study used bay leaf powder, and mint leaf powder, namely dried bay leaves and mint leaves sieved using a mesh sieve number 60. Grind simplicia aims to reduce the particle size because particle size and extraction time affect the degree of fineness of bay leaf and mint leaf powder. The purpose of sifting is to prepare a powder size that is good enough to facilitate the withdrawal of compounds because from sifting you will get bay leaf and mint leaf powder of the same size to allow the complete withdrawal of compounds.

This study used the maceration extraction method because in addition to the equipment and processing techniques used are simple, and easy to do, and the operational costs are relatively low. Maceration can also be used to extract compounds that are thermolabile because maceration is carried out without heating (Marjoni, 2016). The solvent used is 70% ethanol, according to Agustiningsih (2010), ethanol is the most optimal solvent for attracting phenolic compounds and flavonoids compared to water solvents or ethanol-water mixtures.

The concentration of ethanol can affect the solubility of compounds in the solvent, the higher the ethanol concentration, the lower the polarity of the solvent. Based on polarity and solubility, polar compounds will easily dissolve in polar solvents, while non-polar compounds will easily dissolve in non-polar solvents (Arifianti, 2014).

Maceration extraction for bay leaves (*Syzygium polyanthum*) and mint leaves (*Coleus amboinicus* L.) was carried out for 5 days, namely 3 days for maceration and 2 days for remaceration. The purpose of remaceration is to withdraw the compound content that is still left behind during the first maceration, after maceration is then carried out by evaporation using a water bath with a temperature of 40ºC (Bempa et al., 2016). The boiling point of 70% ethanol is 70ºC, the higher the boiling point, the longer the evaporation process takes. This is because phenolic compounds are susceptible to oxidation at high temperatures, resulting in changes in chemical structure and the measured phenolic levels are lower (Sulaksono, 2015).

The toothpaste formulation was made into 3 (three) formulas with variations of bay leaf extract. The formula I (F1) used 3 g of bay leaf extract, formula II (F2) used 4.5 g of bay leaf extract, and formula III (F3) used 6 g of bay leaf extract. Toothpaste preparations in this study used additional ingredients such as CaCO3 as much as 3.9 g which functions as an abrasive material used to smooth toothpaste preparations.

Sorbitol is a binder or usually also called a thickening agent which can prevent toothpaste from drying out due to water binding it and also controls the toothpaste preparation so that it remains consistent and also has an emulsifier effect which works by preventing the separation of solid and liquid substances. Glycerin is a humectant that can be used to give a paste texture and prevent water loss and harden toothpaste preparations when exposed to air.

Sodium Lauryl Sulphate (SLS) has a foaming effect which is useful for cleaning teeth. CMC Na functions as an emulsifier or thickener and can increase viscosity, and finally uses an additional ingredient in the form of methylparaben which functions as a preservative and can prevent the growth of microorganisms in toothpaste preparations (Angger, 2012).

An organoleptic test is a test that is carried out by looking directly using the five senses that are produced including smell, shape, and color. The results of the organoleptic test can be seen in Table 1.

Table 1. Organoleptic test results for toothpaste preparations combined with bay leaf extract (*Syzygium polyanthum*) and mint leaves (*Coleus amboinicus* L.)

No.	Formula	Observation result		
		Smell	Form	Color
1.	Formula I (Bay Leaf Extract 3 g)	Typical bay leaves and mint leaves	Pasta	Light brown
2.	Formula II (Bay Leaf Extract 4,5 g)	Typical bay leaves and mint leaves	Pasta	Brown
3.	Formula III (Bay Leaf Extract 6 g)	Typical bay leaves and mint leaves	Pasta	Dark brown

Source: Primary Data Research Results, 2022

Organoleptic testing was carried out to determine the color, smell, and shape. Formula III (F3) produces a paste but is very thick. This is due to the large number of extracts used in formula III (F3) compared to formula I (F1) and formula II (F2). According to Setyaningrum (2013), toothpaste preparations are said to be homogeneous if there is an even color equation and there are no particles or coarse materials that can be touched. The toothpaste preparation formula in formula III (F3) produces an unattractive color because more extracts are used compared to formula II (F2) and formula I (F1), so it is treated further by changing formulation III (F3), namely by reducing the amount of bay leaf extract used.

The homogeneity test was carried out on toothpaste preparations to determine the homogeneity of the toothpaste preparations. Toothpaste is said to be good if it meets the national standard for toothpaste based on SNI no. 12-3524-1995 i.e. homogeneous, with no air bubbles, lumps, and separate particles. The homogeneity test results can be seen in Table 2.

Table 2. Results of homogeneity test of toothpaste preparations combining bay leaf extract (*Syzygium polyanthum*) and mint leaves (*Coleus amboinicus* L.)

No.	Information	Result
1.	Formula I (Bay Leaf Extract 3 g)	Homogenous
2.	Formula II (Bay Leaf Extract 4,5 g)	Homogenous
3.	Formula III (Bay Leaf Extract 6 g)	Inhomogeneous

Source: Primary Data Research Results, 2022
Information :
Homogeneous: No air bubbles, lumps, and separate particles
Inhomogeneous: The presence of separate particles

The homogeneity test aims to see whether the toothpaste preparation made is homogeneous or evenly mixed between the active substance and the ointment base. This is probably due to the large number of bay leaf active ingredients used in formula III (F3) compared to formula I (F1) and formula II (F2), which makes the formula more sticky and viscous so that it is difficult for the solid material in powder form to be homogeneous. The resulting color results were different between formula I (F1), formula II (F2), and formula III (F3) because the bay leaf extract used was different, namely in formula I (F1) as much as 3 g, formula II (F2) as much as 4, 5 g, and formula III (F3) as much as 6 g.

Testing the pH value is carried out to determine the level of acidity or alkalinity of the resulting toothpaste preparations. A pH value that is too acidic will irritate the mouth, while a pH value that is too alkaline can result in rough/scaly skin. The requirements for the quality of the pH of toothpaste preparations according to Indonesian national standards are 4.5-10.5 so as not to irritate the mucosa in the mouth (Ardhi, 2017). Based on the results of testing the pH value of the toothpaste preparation formula for formulas 1, 2, and 3, it has a pH value of 7. The results of the pH test can be seen in Table 3. Based on research by Yuliastri, et al (2019), the results of the pH test on breadfruit leaf extract toothpaste were 7, which means according to the Indonesian National Standard.

Table 3. pH test results for toothpaste preparations combining bay leaf extract (*Syzygium polyanthum*) and mint leaves (*Coleus amboinicus* L.)

No.	Information		pH	Mean± SD
1.	Formula I (Bay Leaf Extract 3 g)	Replication 1	7	7 ± 0
		Replication 2	7	7 ± 0
		Replication 3	7	7 ± 0
2.	Formula II (Bay Leaf Extract 4,5 g)	Replication 1	7	7 ± 0
		Replication 2	7	7 ± 0
		Replication 3	7	7 ± 0
3.	Formula III (Bay Leaf Extract 6 g)	Replication 1	7	7 ± 0
		Replication 2	7	7 ± 0
		Replication 3	7	7 ± 0

Source: Primary Data Research Results, 2022

A foam formation test was carried out to find out whether toothpaste containing bay leaf extract (*Syzygium polyanthum*) and mint leaves (*Coleus amboinicus* L.) can produce foam when used. The results of the foam power test can be seen in Table 4.

Table 4. Results of the foaming power test of toothpaste preparations combined with bay leaf extract (*Syzygium polyanthum*) and mint leaves (*Coleus amboinicus* L.)

No.	Information		Foam Power Value	Mean (cm) ± SD
1.	Formula I (Bay Leaf Extract 3 g)	Replication 1	4 cm	3,93 ± 0,05
		Replication 2	3,9 cm	
		Replication 3	3,9 cm	
2.	Formula II (Bay Leaf Extract 4,5 g)	Replication 1	4 cm	3,96 ± 0,05
		Replication 2	3,9 cm	
		Replication 3	4 cm	
3.	Formula III (Bay Leaf Extract 6 g)	Replication 1	3,9 cm	3,96 ± 0,05
		Replication 2	4 cm	
		Replication 3	4cm	

Source: Primary Data Research Results, 2022

The use of sodium lauryl sulfate in the three formulas is as much as 0.6 g so the average obtained in formula I (F1) is 3.93 cm, while formula II (F2) and formula III (F3) is 3.96 cm. A measure of the height of the foam can be related to the aesthetic value preferred by consumers. The parameter on the foam height meter is very dependent on the concentration of the foam former which in this formula uses sodium lauryl sulfate. The variation of the extract used can also affect the height of the foam in the preparation, foam is formed in the presence of surfactants in the liquid and changes the dispersion system between the air bubbles separated by the liquid layer so that the surfactants can reduce the tension at

the air/liquid interface. The higher the viscosity, the more difficult it is for the substance to come out of the compound (Madan & Singh, 2010).

A spreadability test was carried out to find out how much the paste spread when it was used. The results of the spreading power test are in the good category which can be seen in Table 5.

Table 5. The results of the spreadability test for the toothpaste combination of Bay Leaf Extract (*Syzygium polyanthum*) and mint leaves (*Coleus amboinicus* L.)

No.	Information	Heavy (g)	Replication 1	Replication 2	Replication 3	Mean (cm) ± SD
1.	Formula I (Bay Leaf Extract 3 g)	0	4,45 cm	4,6 cm	4,5 cm	4,51 ± 0,07
		50	4,75 cm	4,78 cm	4,76 cm	4,76 ± 0,01
		100	5,0 cm	5,1 cm	5,2 cm	5,1 ± 0,1
		150	5,25 cm	5,27 cm	5,29 cm	5,27 ± 0,02
2.	Formula II (Bay Leaf Extract 4,5 g)	0	4,5 cm	4,52 cm	4,6 cm	4,54 ± 0,05
		50	4,6 cm	4,63 cm	4,65 cm	4,62 ± 0,02
		100	4,7 cm	4,71 cm	5,2 cm	4,87 ± 0,28
		150	4,9 cm	5,0 cm	4,9 cm	4,93 ± 0,05
3.	Formula III (Bay Leaf Extract 6 g)	0	4,15 cm	4,2 cm	4,21 cm	4,18 ± 0,03
		50	4,2 cm	4,22 cm	4,25 cm	4,22 ± 0,02
		100	4,4 cm	4,6 cm	4,7 cm	4,56 ± 0,15
		150	4,6 cm	4,65 cm	4,8 cm	4,68 ± 0,10

Source: Primary Data Research Results, 2022

Based on the results of the spreadability test that has been carried out in Table 5 that the average in formula 1 (F1) produces a spreadability of 5.27 cm, formula II (F2) of 4.93 cm, and formula III (F3) of 4, 68cm. This already meets the standards of good toothpaste because it has a value range of 2.61 – 5.32 cm. The results of the three formulations are different because the thicker the extract, the less spread of the gel. The difference in the spreading power produced by a paste is caused by several influencing factors, namely the weight of the load and the mass of the paste being tested. Spreadability that is too high indicates that the paste consistency is too runny and easily crumbles or dissolves like lotion and is difficult to apply when used (Doko, 2018). Na CMC affects increasing the viscosity and decreasing the spreadability of toothpaste (Sultana et al, 2016).

The phytochemical test aims to determine the content of active compounds contained in plants. The phytochemical screening method is carried out by testing the color using a color reagent (Widayanti et al., 2009). The results of the phytochemical test can be seen in Table 6.

Table 6. Results of Phytochemical Screening of Bay Leaf Extract Toothpaste (*Syzygium polyanthum*) and Mint Leaf (*Coleus amboinicus* L.)

No.	Information	Phytochemical Screening	Result	Conclusion
1.	Formula I (Bay Leaf Extract 3 g)	Flavonoid	Orange color formed	+
		Saponin	Formed foam as high as 3 cm for about 10 minutes	+
		Tanin	The blackish-blue color formed	+
2.	Formula II (Bay Leaf Extract 4,5 g)	Flavonoid	Orange color formed	+
		Saponin	Formed foam as high as 3 cm for about 10 minutes	+

		Tanin	The blackish-blue color formed	+
3.	Formula III (Bay Leaf Extract 6 g)	Flavonoid	Orange color formed	+
		Saponin	Formed foam as high as 4 cm for about 10 minutes	+
		Tanin	The blackish-blue color formed	+

Source: Primary Data Research Results, 2022
Information :
+ = positive for containing phytochemical compounds (flavonoids, saponins, and tannins).

The phytochemical test carried out was a qualitative test of flavonoids with Mg metal and concentrated HCl. The function of concentrated HCl is to hydrolyze flavonoids into their aglycones, namely by hydrolyzing O-glycosyl (Baud, 2014). The addition of concentrated Mg and HCl produces a complex compound of flavilium salts which are yellow, red, and orange in flavonones, flavonols, flavonolols, and zanthone compounds (Marliana et al., 2005). The qualitative test of flavonoids that has been carried out from the three formulations produces an orange color so that the toothpaste preparation can be said to be positive for the presence of flavonoid compounds. Flavonoids function as antibacterials by forming complex compounds against extracellular proteins which cause damage to the structure and changes in the mechanism of the bacterial cell membrane (Aulia et al., 2007).

Qualitative test of saponins on toothpaste preparations Bay Leaf Extract (Syzygium polyanthum) and mint leaves (Coleus amboinicus L.) showed a stable foam for approximately 10 minutes with a height of 1-3 cm and if 1 drop of 1 N HCl was added the foam would not disappear, the positive toothpaste preparation contains saponins. This happens because saponin compounds are generally in the form of glycosides so they tend to be polar. Saponin is a glycoside with a hydroxyl group on its molecule and contains hydrophilic and hydrophobic groups. The presence of foam in the saponin test indicates the presence of glycosides which can form froth in water and hydrolyzes into glucose and other compounds (Ergina, et al., 2014). Saponins work as antibacterials by reacting with porins (transmembrane proteins) on the outer membrane of the bacterial cell wall, forming strong polymer bonds resulting in damage to the porin and inhibited or dead bacterial growth (Ainurrochman, et al., 2013).

Qualitative test of tannins on toothpaste preparations Bay Leaf Extract (Syzygium polyanthum) and mint leaves (Coleus amboinicus L.) by adding FeCl3 solution. The addition of FeCl3 is used to determine the presence of phenol groups present in the sample, the presence of phenol groups is shown in black or dark blue after adding the FeCl3 reagent. This is because tannins will form complex compounds with Fe3+ ions (Ergina et al., 2014). The results of the research that has been done and are shown in Table 6 that toothpaste preparations show a black color when added with FeCl3 reagent, this indicates that the toothpaste preparations contain tannin compounds positively. This is in line with research that has been carried out by Jannah (2021) testing the tannin compound class in Bay Leaf Extract by adding FeCI3 solution. The results of the phytochemical tests showed that Bay Leaf Extract contained tannin compounds, this was because the tannin compound group is a phenolic compound that tends to dissolve in polar solvents such as ethanol. Tannins can shrink the cell walls or cell membranes of bacteria thereby interfering with the permeability of the cell itself. As a result of disturbed permeability, cells can carry out living activities so that their growth will be stunted or even die (Aulia et al., 2007).

The results of this study indicated that the toothpaste preparations with the active ingredients Bay Leaf Extract (Syzygium polyanthum) and mint leaves (Coleus amboinicus L.) were formulated by comparing the active ingredients Bay Leaf Extract in formula I (F1), formula II (F2), and Formula III (F3) shows that only formula I (F1) can form toothpaste with good physical quality because it fulfills the organoleptic test parameters, homogeneity test, spreadability test, pH test, and foam formation test.

CONCLUSION

Based on the results of the research that has been done, it can be concluded that the results of the combination formulation of Bay Leaf Extract toothpaste (*Syzygium polyanthum*) and mint leaves (*Coleus amboinicus* L.) in formula I (F1) and Formula II (F2) meet the requirements for toothpaste preparations that are good but in formula III (F3) it does not meet the requirements for a good toothpaste preparation. Meanwhile, the results of evaluating the quality of the combination toothpaste preparation Bay Leaf Extract and mint showed that the three formulas were brown and had a distinctive aroma of bay leaves and mint leaves. Toothpaste preparations for formula I (F1) and formula II (F2) were homogeneous while those for formula III (F3) were not homogeneous. The pH test of the three formulas had a pH value of 7. The foam power test obtained an average of 3.93 cm in formula I (F1), while in formula II (F2) and formula III (F3) 3.96 cm. The spreadability test obtained an average of 5.27 cm in formula I (F1), 4.93 cm in formula II (F2), and 4.68 cm in formula III (F3). Based on the results of the phytochemical screening test of Bay Leaf Extract and mint leaves in the toothpaste preparations, the three formulations contained flavonoids, saponins, and tannins.

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