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Formulation of Gel HandSanitizer Ethanol Extract Salam Leaves with Carbopol and Na CMC as Gelling Agent

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ABSTRACT

Hand sanitizer gel has been widely used as a way to maintain hand health and hygiene that is practical and easy to carry. Generally hand sanitizer gels contain alcohol compounds as antiseptics to kill bacteria, but the use of antiseptic gels that contain alcohol in the long term can cause irritation. Therefore, we need natural alternative materials that are friendly to the skin and do not irritate the skin, one of the plants that has antibacterial power is bay leaf (Syzygium polyanthum). The purpose of this study was to determine the formulation and physical properties of hand sanitizer gel from bay leaf extract (Syzygium polyanthum). This research is an experimental study with research data presented descriptively. The gel was made in three formulas with different carbopol concentrations, namely 0.2%, 0.5%, and 3% Na CMC. The evaluation of the physical properties of the gel included organoleptic, homogeneity, dispersibility, adhesion, and pH tests. The results of the evaluation showed that formula 1 (Na CMC 3%, ethanolic extract of bay leaf 12.5%) and formula 2 (carbopol 0.2%, ethanolic extract of bay leaf 12.5%) fulfilled all the requirements for evaluating the physical properties of the gel which included organoleptic test, homogeneity, spreadability, adhesion, and pH. While formula 3 (carbopol 0.8%, ethanol extract of bay leaf 25%) did not meet the physical properties test, namely the dispersion test.

INTRODUCTION

Health is a very important aspect of life. Maintaining hand hygiene as an effort to maintain a healthy body. People are not aware that in their activities, hands are often contaminated with bacteria (1). Bacteria have the potential to become pathogens if the number exceeds the limit and will be a danger to humans (2). One of the easiest ways to prevent the spread of bacteria is to wash your hands. Hand washing can reduce the number of bacteria by up to 58%. People often use antiseptic gel as a hand sanitizer to replace soap and water to make it more practical. Its effective and efficient use is the main attraction of the Hand Sanitizer.

Excess hand sanitizer can kill germs in a relatively fast time. The active ingredients of hand sanitizers are generally alcohol compounds with a concentration of ± 60% to 80% and phenol (triclosan) groups so that they have a working mechanism by denaturing and coagulating germ cell proteins. The use of hand sanitizer can reduce the risk of dry skin due to washing hands too often with soap and can cause irritation if used repeatedly. One way to reduce the use of alcohol and triclosan is to add natural ingredients that have antibacterial properties (3). One of the plants that has antibacterial activity is the bay plant (Syzygium polyanthum Wight) (4). Salam plant is an herbal plant that has antibacterial, antidiarrheal, antioxidant, antihypertensive, anticholesterol and antidiabetic properties. Salam plants have the highest chemical content in the leaves (5). Bay leaf (Syzygium polyanthum) contains antibacterial substances, tanning substances and essential oils. In addition, it also contains other chemical compounds that provide antibacterial activity such as flavonoids, phenols and triterpenes. Syzygium polyanthum essential oil has antimicrobial activity against B. subtilis, S. aureus, S. typhimurium and V. Cholera. Ethanol extract of bay leaf (Syzygium polyanthum) inhibited the growth of Staphylococcus epidermidis, Streptococcus mutans, Bacillus subtillis, Pseudomonas aeruginosa, Salmonella typhi, Escherichia coli, Shigella

dysenteriae and Candida albicans fungi (6). Bay leaf extract at concentrations of 12.5%, 25%, 50%, 75%, 100% gave an inhibition zone against Staphylococcus aureus.

Gel is one of the drug preparations that are widely used by the public. Gels have several advantages over other topical preparations, namely the ability to spread well on the skin, do not inhibit the physiological function of the skin because it does not coat the skin surface tightly and does not clog the skin pores, gives a cool sensation, is easily washed off with water, allows use on parts of the body that are irritated. Hair and good drug release.

This study aims to determine the formulation of hand sanitizer gel from bay leaf extract (Syzygium polyanthum) with Carbopol and Na CMC as gelling agents.

METHODOLOGY

The type of research used is experimental research and the research data are presented descriptively. The materials used in this study were bay leaf (Syzygium polyanthum), water, carbopol, Na CMC, bay leaf extract, glycerin, triethanolamine, methyl paraben, aquades, and ethanol. The tools used are glass tools, digital scales, extraction tools, stirring rods, measuring cups, pH meters or digital pH, object glass, thermometers, petri dishes, adhesive test equipment, dispersion test equipment.

Making 70% ethanol extract of bay leaves using the maceration method. A total of 200 g of bay leaf powder was put into a vessel then given 70% ethanol in a ratio of 1:10 times that of bay leaf powder (2 L). Bay leaves that have been submerged in 70% ethanol are allowed to stand for 24 hours in a place protected from light, while being stirred repeatedly. After 24 hours, then filtered and macerated 2 times. Furthermore, the filtrate was collected to be concentrated with a rotary evaporator at a temperature of 50°C in order to obtain a thick extract.

The gel preparation was made with the composition according to table 1 in the following way: 5ml of distilled water was heated to a temperature of 70^{o}C then CMC-Na was added while stirring until a homogeneous mass was formed. To the mixture was added a mixture of methyl paraben, glycerin and triethanolamine. The mixture was stirred until homogeneous. After the gel base is formed, ethanol extract of bay leaves is added, alcohol is added and distilled water is added to a volume of 100 ml (F1). For formulas 2 and 3 the procedure is the same but Na CMC is replaced with carbopol.

Table 1. Gel Formulation Design

Material	**F1**	**F2**	**F3**
Na. CMC	3%	-	-
Carbopol	-	0,2 %	0,5 %
Salam Leaf Extract	12,5 %	12,5 %	25 %
Glycerin	1 %	1%	1%
Triethanolamine	9,15 %	9,15 %	9,15 %
Methyl Paraben	0,2 %	0,2 %	0,2 %
Alcohol 70 %	60 %	60 %	60 %
Aquades ad	100 ml	100 ml	100 ml
Information:			
F1 : Formula 1; F2 : Formula 2; F3 : Formula 3			

Furthermore, an evaluation of the physical properties of the hand sanitizer preparation is carried out which includes:

Organoleptic test

The organoleptic test of the gel was observed visually by observing the shape, color and odor of the gel.

Homogeneity Test

The preparation is carried out by applying a gel sample to a glass object or other suitable transparent material, the preparation must show a homogeneous arrangement and no coarse grains are visible.

Spreadability

The dispersion test was carried out by placing 0.5 grams of the preparation on the top of the glass, given the same glass, and increasing the load, and given a time span of 1 minute. The spread is measured at each additional load, when the stock stops spreading (with a certain time on a regular basis) (7).

Adhesion

The adhesion test was carried out by placing the gel (enough) on a glass object with a predetermined area. Place another glass object on top of the gel and press it with a weight of 1 kg for 5 minutes. Mount the glass object on the tool. Release the weight of 100 g and record the time until the two glass objects are released.

RESULTS AND DISCUSSION

This study made a hand sanitizer formulation with active ingredients of bay leaf extract derived from natural ingredients as an alternative material that is friendly to the skin and does not irritate the skin and tested its physical properties.

The Hand Sanitizer formulation in this study consisted of several compositions, namely carbopol which functions as a gelling agent or gel base, Na CMC as a gelling agent or gel base, glycerin as a moisturizer, TEA functions as a base agent and can also be used as an emulsifying agent, methyl paraben as gel preservative, glycerin as humectant, and bay leaf extract as an antibacterial substance.

Hand sanitizer gel organoleptic test results

The three formulations were tested for their physical properties. The organoleptic test of the three formulas that met the requirements can be seen in Table 2. The gel form of formula 3 has a thicker consistency when compared to formula 1 and formula 2, the gel is getting thicker as the composition of the carbopol percentage increases. The color in formula 3 is more concentrated because it contains more ethanol extract of bay leaves.

Table 2. Organolpetic test results of gel hand sanitizer

Formulation	Color	Shape	Odor
F1	Brown	Thick gel is slightly liquid	special smell of greeting leaves
F2	Brown	Thick gel is slightly liquid	special smell of greeting leaves
F3	Brown	Thick gel is slightly liquid	special smell of greeting leaves

Hand sanitizer gel homogeneity test results

The three hand sanitizer gel formulas showed that they had met the homogeneity requirements and the absence of coarse granules. This test is to determine that the active substance is evenly distributed in the preparation and there are no lumps of particles.

Table 3. Results of homogeneity test of hand sanitizer gel

Formulation	Result
F1	Homogeneous
F2	Homogeneous
F3	Homogeneous

Spreadability test results

The results of the dispersion test of the gel preparations in formula 1, formula 2 and formula 3, respectively, were 5.5 cm, 5.7 cm and 4.9 cm. Formulas 1 and 2 meet the requirements for the dispersion test, while formula 3 does not meet the requirements because the requirements range from 5-7 cm (Sayuti, 2015). The higher the amount of carbopol used, the thicker the gel, so that in this test formulas 1 and 2 have a fairly wide spread compared to formula 3 because in formula 3 the number of carbopol used is more than formulas 1 and 2.

Adhesion test results

The results of the adhesion test of the three formulations showed that the three formulas met the requirements, namely the adhesive power of not less than 4 seconds. The results of the adhesion test from formulations 1 to 3 were increasing due to the use of various carbopols with higher concentrations in each formula which caused the gel consistency to become thicker and caused the gel adhesion to increase along with the increase in carbopol concentrations.

Table 4. Test results for hand sanitizer gel adhesion

Formulation	Adhesive Strength
F1	8,3 second
F2	17 second
F3	22 second

pH test results

The pH test results obtained from the three formulations include F1 5, F2 5.5 F3 6. These results indicate that the three formulas meet the skin pH criteria of 4-8 (8).

CONCLUSION

The gel formulation was made in three formulas with different gelling agents and concentrations of bay leaf ethanol extract. Formula 1 (Na CMC 3% and ethanolic extract of bay leaf 12.5%) and formula 2 (carbopol 0.2, ethanolic extract of bay leaf 12.5%) fulfilled all the requirements for evaluating the physical properties of the gel which included organoleptic tests, homogeneity, spreadability, adhesion, pH, and viscosity. While formula 3 (carbopol 0.8% and ethanol extract of bay leaf 25%) did not meet the physical properties test, namely the dispersion test.

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