ASTEEC Conference Proceeding: Applied Science
3rd International Conference on Obstetricians Participating in Training for Innovative Measures to Advance Leadership 2025 (OPTIMAL 2025)
14 June 2025 (Online)

Antibacterial Activity Test of Liquid Bath Soap from Aloe vera Mucus

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Abstract. Maintaining body cleanliness is a process for maintaining body cleanliness and health. One way to maintain personal hygiene is by bathing regularly using soap. Soap is a cleaning agent that is commonly used to clean oneself from various dirt, bacteria, and other contaminants. The use of soap has expanded, namely in the cosmetics sector, because soap can function to maintain moisture, softness, and healthy skin. As people's tastes and demands vary, we can now find various forms of soap preparations, such as solid soap, liquid soap, gel, paper soap, and transparent soap. The use of liquid bath soap is increasingly popular because it is easy to use and efficient at cleaning impurities from the skin. Escherichia coli bacteria are gram-negative bacteria that can cause diarrhea due to the entry of E. coli bacteria into the body through hands contaminated with these bacteria, so it is recommended to wash your hands before eating and after handling dirty objects. Liquid bath soap is a skin cleansing preparation that protects the skin from dangerous bacteria because it has a special formula. One alternative raw material for killing bacteria in bath soap preparations is aloe vera, which is more often called Aloe Vera (Aloe barbadensis Miller). This research aims to provide information on the use of aloe vera plant mucus as liquid bath soap and to create a special formula for liquid bath soap containing aloe vera mucus, to find out the antibacterial activity of liquid bath soap against Escherichia coli bacteria. The research method stages included organoleptic observations, total plate numbers, and antibacterial preparation tests. The antibacterial activity test for liquid bath soap was carried out using the agar diffusion method (Kirby Bauer test) using paper discs with a diameter of 5 mm by calculating the diameter of the clear zone against E.coli bacteria. The average diameter of the clear zone was 15.86 mm in the experiment with formula 1 preparation samples (10%), and the average diameter of the clear zone was 19.4 mm in the experiment with formula 2 preparation samples (15%). Based on the average clear zone, the higher the concentration of the liquid bath soap preparation, the higher the clear zone formed, and vice versa. So it can be concluded that aloe vera liquid bath soap meets the requirements as an antibacterial soap

Keywords: Liquid Bath Soap, Aloe Vera, Antibacterial, Escherichia Coli

INTRODUCTION

Eschericia coli bacteria are gram-negative bacteria that can cause diarrhea if they enter the body through hands contaminated with the bacteria. These bacteria can become pathogens if they are in tissues outside the intestines where they are usually found (Brooks et al., 2010). Soap is a cleaning agent that is commonly used to clean oneself from various dirt, bacteria, and other impurities. The use of soap has expanded, namely in the field of cosmetics because soap can function to maintain moisture, softness and skin health (Gusviputri et al., 2013). Liquid soap is a liquid preparation intended to clean the skin, from basic soap ingredients to which surfactants, preservatives, foam stabilizers, fragrances and permitted dyes are added, and can be used for bathing without causing skin irritation. (Sari and Ade, 2017). Along with the diversity of tastes and demands of the community, now many forms of soap preparations are found, such as solid soap, liquid soap, gel, paper soap, and transparent soap. The use of liquid soap is increasingly in demand because it is easy to use and efficient in cleaning dirt from the skin (Febriani et al., 2020).

One of the alternative plants that contains phytochemical compounds that are useful as antibacterial and are easily found in the surrounding environment is aloe vera. Aloe vera extract is reported to contain active compounds in the form of anthraquinones, which have a structure analogous to tetracycline and can inhibit bacterial protein synthesis by blocking ribosomal A. Polysaccharides in Aloe vera extract play a role in stimulating phagocytosis activity in leukocytes to destroy bacteria. Aloe vera contains pyrocatechol which is known to have a toxic effect on microorganisms (Radha and Laxmipriya, 2015). Based on the description above, the soap used in this experiment is soap with aloe vera mucus as the basic ingredient. This study aims to provide information on the use of aloe vera plant mucus as a liquid soap and to create a special formula for liquid soap to determine the antibacterial activity of liquid soap against Eschericia coli bacteria.

The classification of aloe vera plants is as follows:
Kingdom: Plantae
Division: Magnoliophyta
Class: Lilieropsida
Ordo: Asparagales
Family: Asphodelaceae
Genus: Aloe
Species: Aloe vera (Maryam, 2013)

Figure 1. ***Aloe vera***

the aloe vera plant is classified as a succulent plant, lives in dry places and is a low shrub. has circular leaves (rosette), short plant stems. the leaves are 40-90cm long, 6-13cm wide with a thickness of approximately 2.5cm at the base of the leaf, and the flowers are bell-shaped. these stems are fibrous and woody, generally very short and almost invisible because they are covered by dense leaves and are partly buried in the ground (purbaya, 2003).

Aloe vera is efficacious as an antifungal, anti-inflammatory, antibacterial. aloe vera contains saponins that have the ability to kill germs. according to research by artanti et al. (2006) that a number of medicinal plants containing anthraquinone are reported to have antibacterial, antiviral, anti-inflammatory, antiallergic, and anticancer activities. anthraquinone works by inhibiting protein synthesis so that bacteria cannot grow in media containing aloe vera mucus (teresya puteri, 2013). quinone compounds as antibacterial and pain relievers. saponins are found in clear jelly-like liquids that contain antibacterial and antifungal substances that can stimulate fibroblasts, namely skin cells that function to heal wounds (sulaeman, escherichia coli bacteria are gram-negative rod-shaped bacteria with a size ranging from 1.0-1.5 μm, non-motile or motile with flagella, can grow with or without oxygen, have facultative anaerobic properties, e. coli can grow in fresh water, sea water, soil. diseases that are often caused by e. coli are diarrhea due to bacteria entering the body through hands contaminated with bacteria (brooks et al., 2010) liquid bath soap is one of the skin cleansers made from soap with permitted additions and can be used for bathing without causing allergies

and irritation to the skin. liquid bath soap is a product that is widely preferred by the public because it is more hygienic in storage and practical to carry

METHODS

Sample preparation

The aloe vera leaf samples obtained were washed clean, then the flesh was taken and blended to obtain the mucus, then filtered using gauze.

Organoleptic Test

This organoleptic test was carried out to evaluate the quality of aloe vera leaf mucus physically including appearance, color and odor on days 1, 3, 7, then every 7 days for 56 days of observation.

Aloe Vera Slime Liquid Bath Soap Formula

Table 1 composition of Aloe Vera Slime Liquid Bath Soap Formula

Ingredients	Formula % (w/v)	
	Formula 1	Formula 2
Aloe vera leaf slime	10	15
VCO	10	10
Potassium hydroxide	16	16
Sodium carboxyl methyl cellulose	0,5	0,5
Stearic acid	0,5	0,5
Sodium benzoate	0,5	0,5
Sodium lauryl sulfate	5	5
Fragrance	q.s	q.s
Aquades	Ad 100	Ad 100

.

How to make liquid bath soap as follows:

a. Weigh 10 grams of aloe vera leaf gel, then weigh 0.5 grams of sodium carboxymethyl cellulose, 0.5 grams of stearic acid.
b. Put 10 mL, 20 mL, 30 mL of VCO into a beaker, then add 16 mL of 67% potassium hydroxide little by little while continuing to heat at a temperature of 50°C until a soap base is obtained.
c. Add 25 mL of distilled water to the soap base, then neutralize with 10% b/v citric acid solution, then add sodium carboxymethyl cellulose that has been developed in hot distilled water, stir until homogeneous.
d. Add stearic acid, stir until homogeneous.
e. Add sodium benzoate, then stir until homogeneous.
f. Add aloe vera leaf mucus, stir until homogeneous.
g. Add the appropriate fragrance then stir until homogeneous.
h. The mixture is then added with sodium lauryl sulfate, after which distilled water is added until the volume is 100 mL, then stirred until homogeneous.
i. Put it in a clean container that has been prepared
j. Making liquid soap, each formula, is made in triplicate.

Antibacterial activity test of Aloe Vera Slime Liquid Bath Soap Preparation Escherichia coli Bacterial Inoculum Preparation

E. coli colonies were taken from bacterial culture stocks that had grown on slanted Nutrient Agar (NA) media taken using a sterile ose needle. The bacterial colonies were then suspended in a tube containing 10 ml of Nutrient Broth (NB) solution, then shaken for 48 hours.

Liquid Bath Soap Activity Test

A total of 1 ml of inoculum was put into a sterile petri dish, then 15 ml of Nutrient Agar (NA) media was poured at a temperature of 40-45°C, then slowly homogenized near the Bunsen flame so that the media and bacteria were evenly mixed and left to solidify. One sterile disc paper was prepared using sterilized tweezers over a Bunsen flame and then soaked in liquid bath soap solution for 15 seconds, placed on the solidified

media, then incubated at room temperature for 40 hours. After the clear zone was formed, each petri dish was measured for the diameter of the clear zone around the paper disc using a vernier caliper.

RESULTS AND DISCUSSION

Organoleptic

The results of observations of changes in shape, color, and odor of aloe vera leaf mucus during 56 days of storage, namely:

Table 2 Organoleptic Observation Results of Aloe Vera Mucus during 2 months of storage (56 days)

Day	Form	Smell	Color
1	Slightly thick liquid	Typical of aloe vera	Pale green
3	Slightly thick liquid	Typical of aloe vera	Pale green
7	Liquid	Typical of aloe vera	Pale green
14	Liquid	Typical of aloe vera	Pale green
21	Liquid	Typical of aloe vera	Pale green
28	Liquid	Typical of aloe vera	Pale green
35	Liquid	Typical of aloe vera	Yellowish
42	Liquid	Typical of aloe vera	Yellowish
49	Liquid	Typical of aloe vera	Yellowish
56	Liquid	Typical of aloe vera	Yellowish

Aloe vera leaf mucus was observed for organoleptic changes during 2 months (56 days) of storage. This was done to see the quality of aloe vera mucus used as an active ingredient in making liquid soap. The nature of aloe vera leaf mucus is very easily oxidized due to the presence of oxidation enzymes. Contact of the material with air (oxygen) accelerates the oxidation process, so that the gel will turn yellow to brown.

Antibacterial Activity Test Results

The antibacterial activity test of aloe vera slime liquid bath soap uses the agar diffusion method (Kirby Bauer test) by calculating the diameter of the clear zone against E. coli bacteria. The agar diffusion method (Kirby Bauer test) is used to determine the activity of antimicrobial agents. Disc paper containing antimicrobial agents is placed on agar media planted with microorganisms that diffuse into the agar media. Clear areas indicate that there is inhibition of microorganism growth by antimicrobial agents on the surface of the agar media. The ability of an antimicrobial material to eliminate the ability of microorganisms to survive is influenced by the concentration of the antimicrobial material. (Anggraeni et al. 2020)

The results of the antibacterial activity test of aloe vera slime liquid bath soap show antibacterial activity against E. coli bacteria which is indicated by the presence of a clear zone formed on the agar media after

incubation. The inhibition zone is visible after incubation, where the clear area around the disc indicates that the bacterial colony in that area is dead or not growing. The reaction with the sample stops the growth of the surrounding bacterial colonies, so that the area around the sample is brighter than the area of the agar medium where the bacteria grow, there is a diameter of the inhibition zone formed on the media (Komala et al., 2020).

Table 3. Measurement Results Average diameter of the clear zone / inhibition zone of Eschericia coli bacteria

Number	Preparation samples	Average diameter of clear zone/servant zone (mm)
1	Formula 1 (10%)	16,3; 15,6 ; 15,7 = 15,86
2	Formula 2 (15%)	17,8; 20,8; 19,6 = 19,4

The clear zone value can be seen in table 3, the average diameter of the clear zone is 15.86 mm in the experiment with the sample of formula 1 (10%) and the average diameter of the clear zone is 19.4 mm in the experiment with the sample of formula 2 (15%). Data obtained from the antibacterial activity test of aloe vera slime liquid soap can inhibit E. coli bacteria. Based on the average clear zone, the higher the concentration of the liquid soap preparation, the higher the clear zone formed and vice versa. So it can be concluded that aloe vera liquid soap meets the requirements as an antibacterial soap. From the results of the study of the formulation of liquid soap containing aloe vera leaf mucus with an active substance concentration of 10% and 15%, it can be concluded that it is relatively stable during storage and aloe vera liquid soap meets the requirements as an antibacterial soap.

CONCLUSIONS

From the results of the study of the formulation of liquid soap containing aloe vera leaf mucus with an active substance concentration of 10% and 15%, it can be concluded that it is relatively stable during storage and aloe vera liquid soap meets the requirements as an antibacterial soap.

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