http://ejournal.seaninstitute.or.id/index.php/healt
Jurnal Eduhealth, Volume 14, No 01, 2023
E-ISSN. 2808-4608

Effectiveness of Combination of Gotu Kola (Centella Asiatica (L.) Urban) and Aloe Vera Herb Extracts as a Natural Disinfectant

Delladari Mayefis [1], Sri Hainil[2], Andi Bunga Dahlia[3], Ghalib Syukrillah Syaputra[4], Nurlia Oktaviyanti[5]
[1,2,3,4,5] Program Studi Sarjana Farmasi, Institut Kesehatan Mitra Bunda, Batam, Indonesia

ARTICLE INFO

Keywords:
Gotu Kola Extract,
Aloe Vera Extract,
Disinfectants

Email :
dellamayefis@gmail.com

ABSTRACT

Disinfectants are products used to kill microorganisms inside or on the surface of an inanimate object. One of the plants used to kill microorganisms is Gotu Kola (Centella Asiatica (L.) Urban) and Aloe Vera. This study aims to determine the effectiveness and at what concentration the combination of Gotu Kola and Aloe Vera herb extracts can be used as a natural disinfectant. The research was conducted using an experimental method by counting the number of colonies before and after disinfection on a dinner plate. The results showed that the calculation of the percentage reduction in the number of germs on the dinner plate after disinfection using Aloe vera obtained the results of 44.6% at a concentration of 25%, 89.2% at a concentration of 50% and 95.3% at a concentration of 100%. While the percentage reduction in the number of germs on the dinner plate after disinfection using a combination of herb extracts of Gotu Kola and Aloe Vera with a ratio of 1: 2 obtained results of 73.3% at a concentration of 50% and 93% at a concentration of 100%. The combination of Gotu Kola and Aloe Vera extracts can be used as a natural disinfectant at a ratio of 1: 2.

1. INTRODUCTION

Disinfectants are products used to kill microorganisms inside or on the surface of an inanimate object [1]. Disinfectants that are commonly used generally come from synthetic chemicals in the form of artificial chemicals. Synthetic chemicals have disadvantages, namely that they can leave residues and are difficult to decompose, therefore the use of synthetic chemicals needs to be reduced and replaced with natural materials sourced from nature [2].

Indonesia is known as a country with the second largest natural resources after Brazil. Indonesia has about 30,000 plant species out of 40,000 plant species in the world. These plants are widely used for generations to prevent, treat and maintain health [3].

One of the plants used to prevent disease is gotu kola Gotu Kola (Centella Asiatica (L.) Urban) and aloe vera. These two plants have been widely used as anti-septic and disinfectants, based on previous research on the effectiveness of aloe vera as a disinfectant on tables and floors with an average inhibition zone of 5.12 mm and a reduction in the number of bacteria by 45.735% on the table and 52.843% on the floor with a concentration of 75% [2]. And against Escherichia coli bacteria with a concentration of 50% and 75% obtained a probability value of 0.000 ($P<0.05$) [4], Pseudomonas aeruginosa bacteria at 25%, 50% and 100% [5].

Gotu kola leaves contain active ingredients of saponins, flavonoids, tannins, steroids, and triterpenoids. Gotu kola has an antibacterial effect, the content of gotu kola which functions as an antibacterial includes flavonoids and saponins[6]. Based on previous research, gotu kola leaves affect the growth of Aspergillus flavus fungi at a concentration of 0.8% [7], effectively inhibit Streptococcus mutans bacteria at a concentration of 80% [6], Staphylococcus aureus and Escherichia coli at concentrations of 60%, 80% and 100% [8].

Food can be contaminated with microorganisms due to several things, one of which is a dirty kitchen, cooking utensils, and cutlery [9]. The importance of cleanliness of cutlery in health is stated

in the Law of the Republic of Indonesia Number 7 of 1996 concerning food, which states that food sanitation is an effort to prevent the possibility of growth and breeding of rotting microorganisms and pathogens in food, beverages, equipment and buildings that can damage food and endanger humans [10].

From the above background, researchers are interested in conducting research on the effectiveness of the combination of gotu kola and aloe vera extracts as a natural disinfectant because no one has ever conducted a similar study. Currently, existing research is only in the form of antibacterial effectiveness of each of these plants.

2. METHOD

This research was conducted from April to July 2020 at the Pharmacy Microbiology Laboratory of the Mitra Bunda Institute of Health Batam.

The tools used are rotary evaporator (Heidoph), autoclave (Nesco®), laminar air flow, incubator, magnetic stirrer (Velp®) oven, colony counter, digital scales (Kenko®), furnance, measuring cup, erlenmeyer, glass jar, filter paper, funnel, scissors, bunsen, rubber, porcelain crucible, label, sterile cotton, swab, sterile petri dish, sterile measuring pipette, test tube, tube rack, dinner plate. The materials used are gotu kola herb extract, aloe vera extract, PCA (Plate Count Agar) media, transport media (NaCl), 70% ethanol, 96% ethanol, distilled water, hydrochloric acid, mayer reagent, HCL (p), Magnesium powder, FeCl 1%, acetic acid (p) and sulfuric acid (p).

The samples used in this research were gotu kola (Cantella Asiatica (L.) Urban) and aloe vera herb obtained from home yards in Bengkong Abadi 1 Batam City.

Tool Sterilization Using Autoclave. The tools to be sterilized are thoroughly washed first, then dried. Then wrap the tools using aluminum foil. Then insert the tools that have been wrapped into the autoclave to be sterilized with a temperature of 121ºC for 15 minutes [11].

Tool Sterilization Using Oven. The tools to be sterilized are washed thoroughly first, then dried. Then wrap the tools using paper. Then put the tools that have been wrapped in the oven to be sterilized at 171ºC for 2 hours [11].

Preparation of Gotu Kola Herb Extract. Gotu kola herb obtained from Bengkong Abadi 1 was weighed as much as 7 kg and then washed. The gotu kola herb was then air-dried in a room exposed to sunlight for approximately 4 days. The dried gotu kola herb was pulverized with a blender until smooth to a powder and sieved. The powder of gotu kola herb was put into a dark tube and poured with 70% ethanol. poured 70% ethanol. Perform maceration for 3 x 24 hours at room temperature. After 3x24 hours, the solution was filtered using a glass funnel and whatmann filter paper into an erlenmeyer tube. The solution obtained was then evaporated using a rotary evaporator, then aerated using a fan until a thick extract was obtained. The yield obtained is calculated based on the percentage of weight (b/b) using the following equation:

$$\% \text{ Yield} = \frac{\text{weight of extract obtained}}{\text{weight of sample used}} \; x \; 100\%$$

The preparation of aloe vera is done by maceration using 96% ethanol solvent until all the simplisia is submerged for 3 x 24 hours, the filtrate of the extract is then rotary until it gets a thick extract.

Phytochemical Screening

a. Flavonoid Test

The extract was taken as 0.1 gram and put into a test tube. Magnesium powder 0.1 gram and amyl alcohol 0.4 ml were added to the test tube. Alcohol as much as 4 ml was also added and mixed until homogeneous. A positive reaction is indicated by the formation of red, yellow or orange color in the amyl alcohol layer [12].

b. Alkaloid Test

The extract was taken as much as 0.1 gram then added with 5 ml of chloroform and 3 drops of ammonia. The chloroform fraction was separated and acidified with 2 drops of 2M H2SO4. The acid fraction was divided into 3 tubes, each of which was added with Dragendorf, Meyer, and Wagner reagents. Alkaloids in the sample are characterized by the presence of a white precipitate on Meyer's

reagent, a red precipitate on Dragendorf's reagent and a brown precipitate on Wagner's reagent [13].

c. Triterpenoid or Steroid Test

The extract was taken as 0.1 gram and transferred to a drop plate. Anhydrous acetate solution as much as 3 drops and concentrated H2SO4 solution 1 drop were added to the extract. Positive results in this experiment are formed red color for positive results of triterpenoids and green color for positive results of steroids [13].

d. Tannin Test

The extract was taken as 0.1 gram and put in a test tube. Distilled water was added as much as 10 ml and shaken. The sample was allowed to stand for 5 minutes. The sample was filtered with filter paper and the filtrate was collected in another test tube. The filtrate was added with 5 drops of 1% FeCl3 and shaken. The positive reaction of this experiment is the formation of a blackish green color [13].

e. Saponin Test

0.1 gram of extract was taken and placed in a test tube. Distilled water was added 10 ml and shaken for 30 seconds. The positive result of this experiment is the formation of a constant ± 1 cm thick foam [13].

Characterization of Simplisia

a. Organoleptical examination

Physical identification is carried out with the five senses including the smell, shape and color of the simplisia [14].

b. Microscopic Examination

Place a little simplisia powder on the glass object, then drop 1 drop of aquadest and cover using a cover glass. Observe using a microscope with magnification to show the cross section of the simplisia.

c. Purity Check and Stabilization Rules

Observe that the simplisia is free of insects, insect droppings and other impurities, there is no change in color and odor. Store the simplisia in a glass container and protected from sunlight and moisture absorption [15].

Extract Characterization

a. Organoleptical examination

Physical identification with the five senses includes the smell, shape and color of the extract [14].

b. Determination of Drying Shrinkage

Weigh the thick extract as much as 2 grams and then put it into a closed porcelain crust which has previously been heated at 105ºC for 30 minutes and has been tared. After that, the porcelain crust was put into the oven in an open porcelain crust and then dried at 105ºC for 30 minutes, then removed and cooled in a desiccator for 15 minutes and weighed again. Repeat as above until a constant weight is obtained [15].

$$\text{Drying shrinkage} = \frac{(B-A)-(C-A)}{(B-A)} \; X \; 100\%$$

Description :

A = weight of porcelain crucible after heating (g)

B = weight of porcelain crucible + sample before heating (g)

C = weight of porcelain crucible + sample after heating (g)

c. Determination of total ash content

Weigh the thick extract as much as 2 grams and then put it into a porcelain crust which has previously been heated at 105ºC for 30 minutes and has been tared. After that, the porcelain crust was put into the furnace and then ignited at 600ºC for 7 hours, then removed and cooled in a desiccator for 15 minutes and weighed again [14].

$$\text{Ash content} = \frac{(C-A)}{(B-A)} \; X \; 100\%$$

Description :
A = weight of empty porcelain crucible after annealing (g)
B = weight of porcelain crucible + sample before annealing (g)
C = weight of porcelain crucible + sample after annealing (g)

Preparation of Combination Extract [16]

a. 100% Concentration
   - Comparison 1 : 1 ratio was made by taking 2 grams of gotu kola herb extract and 2 grams of aloe vera extract without dilution.
   - Comparison 1: 2 was made by taking 1.33 grams of gotu kola herb extract and 2.67 grams of aloe vera extract without dilution.
   - Comparison 2: 1 was made by taking 2.67 grams of gotu kola herb extract and 1.33 grams of aloe vera extract without dilution.

b. 50% Concentration
   - Comparison 1: 1 is made by taking 500 mg of solution from 100% stock 1: 1 ratio put in a sterile vial then add with 1 ml of sterile aquadest stir until dissolved.
   - Comparison 1: 2 is made by taking 500 mg of solution from 100% stock ratio 1: 2 put in a sterile vial then add with 1 ml of sterile aquadest stir until dissolved.
   - Comparison 2: 1 is made by taking 500 mg of solution from 100% stock of comparison 2: 1 put in a sterile vial then add with 1 ml of sterile aquadest stir until dissolved.

c. Concentration 25%
   - Comparison 1: 1 is made by taking 500 mg of solution from 100% stock ratio 1: 1 put in a sterile vial then add with 2 ml of sterile water stir until dissolved.
   - Comparison 1: 2 is made by taking 500 mg of solution from 100% stock of comparison 2: 1 put in a sterile vial then add with 2 ml of sterile distilled water stir until dissolved.
   - Comparison 2: 1 is made by taking 500 mg of solution from 100% stock of comparison 2: 1 put in a sterile vial then add with 2 ml of sterile distilled water stir until dissolved.

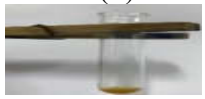
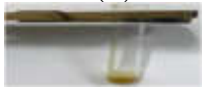
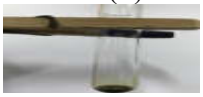
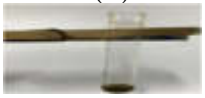
Data Analysis

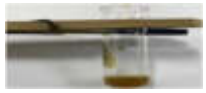
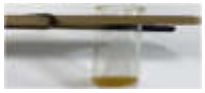
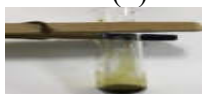
Using ANOVA - Bivariate Paired T-Test statistical analysis to determine the difference between each extract concentration on the number of germs on the plate.

3. RESULTS AND DISCUSSION

Phytochemical Screening Test

Table 1. Phytochemical Screening Test Results of Herba Pegagan and Aloe Vera Extracts

No.	Secondary metabolites	Reagent	Color	Results	
				Gotu kola	Aloe vera
1	Alkaloid	Hydrochloric Acid and Mayer Reagent	White precipitate	 (+)	 (+)
2	Flavonoid	HCl (p) and Mg powder	Yellow	 (+)	 (+)
3	Saponin	Aquadest and HCl (p)	Foaming or frothing	 (+)	 (+)
4	Tannin	FeCl3 1%	Blackish green	 (+)	 (+)

5	Terpenoid	Acetic acid and Sulfuric acid (p)	Jingga	 (+)	 (+)
6	Steroid	Acetic acid and Sulfuric acid (p)	Green	 (+)	 (+)

Based on table 1, phytochemical screening tests on gotu kola herb extracts and aloe vera showed positive results on alkaloid metabolite compounds, flavonoids, saponins, tannins, triterpenoids, and steroids.

Characterization of Simplisia and Extract of Gotu Kola Herb

Figure 1. Cross-section of perisperm in gotu kola herb simplisia

The microscopic test of gotu kola herb showed the presence of perisperm cross-section.

Characteristics of Ethanol Extracts of Gotu Kola and Aloe Vera Herb

Table 2. Results of Characterization Examination of Ethanol Extracts of Gotu Kola and Aloe Vera Herb by Drying Shrinkage Test and Determination of Ash Content

Results of Drying Shrinkage Determination of Gotu Kola and Aloe Vera Herb

Sample	Weight of empty krus	Weight of porcelain crucible + sample before heating	Weight of porcelain crucible + Sample after heating
Gotu kola	34,910	36,910	36,790
Aloe vera	35,085	37,085	36,795

Results of Determination of Total Ash Content of Centella asiatica Herb and Aloe Vera

Sample	Weight of porcelain crucible after annealing	Weight of porcelain crucible + sample before annealing	Weight of porcelain crucible + sample after annealing
Gotu kola	34,855	36,855	35,180
Aloe vera	34,515	36,515	34,765

Based on the data in Table 2 and analyzed using drying shrinkage formula and ash content formula, the characterization examination of ethanol extract of gotu kola herb in drying shrinkage test showed the result of 6%. While the ash content determination test shows the result of 18.75%. And the characterization examination of aloe vera ethanol extract in the drying shrinkage test showed a result of 14, 5%. The total ash content determination test showed a result of 8%.

Germ Count on Dinner Plates before Disinfection

Table 3. Calculation of Germ Numbers on Dinner Plates before Disinfection Using a Combination of Gotu Kola and Aloe Vera Extracts

Replication	Pre 25 %	Pre 50 %	Pre 100 %

1	TBUD	TBUD	TBUD
2	TBUD	TBUD	TBUD
3	TBUD	TBUD	TBUD
Min	TBUD	TBUD	TBUD
Max	TBUD	TBUD	TBUD
Mean	TBUD	TBUD	TBUD

Based on table 3, the results of the calculation of the number of germs on the dinner plate before being treated are TBUD (Cannot be counted or > 300 colonies).

Germ Count on Dinner Plates after Disinfection

Table 4. Calculation of Germ Counts on the Dinner Plates after Disinfection Using Gotu Kola Extract

Replication	Pre 25 %	Pre 50 %	Pre 100 %
1	TBUD	TBUD	TBUD
2	TBUD	TBUD	TBUD
3	TBUD	TBUD	TBUD
Min	TBUD	TBUD	TBUD
Max	TBUD	TBUD	TBUD
Mean	TBUD	TBUD	TBUD

Based on table 4, the results of the calculation of the number of germs on the plate after disinfection using gotu kola herb extract with a concentration of 25% TBUD (Cannot be counted or > 300 colonies), 50% concentration is not countable and 100% concentration cannot be counted.

Table 5. Calculation of Germ Counts on the Dinner Plates after Disinfection Using Aloe Vera Extracts

Replication	Pre 25 %	Pre 50 %	Pre 100 %
1	162	48	17
2	236	30	14
3	100	19	11
Min	100	19	11
Max	236	48	17
Mean	166	32,3	14

Based on table 5, the results of the calculation of the number of germs on the plate after disinfection using aloe vera extract with a concentration of 25% 166 colonies / cm2, 50% concentration is 32.3 colonies / cm2 and 100% concentration is 14 colonies / cm2.

Table 6. Calculation of Number of Germs on the Plate after Disinfection Using Combination of Gotu Kola And Aloe Vera Herb Extracts With a Ratio of (1: 1)

Replication	Pre 25 %	Pre 50 %	Pre 100 %
1	TBUD	TBUD	TBUD
2	TBUD	TBUD	TBUD
3	TBUD	TBUD	224
Min	TBUD	TBUD	224
Max	TBUD	TBUD	TBUD
Mean	TBUD	TBUD	TBUD

Based on table 6, the results of the calculation of the number of germs on the plate after disinfection using a combination of Gotu Kola And Aloe Vera herb extracts with a ratio of 1: 1 at concentrations of 25%, 50% and 100% cannot be calculated.

Table 7. Calculation of the Number of Germs on the Plate after Disinfection Using Combination of Gotu Kola And Aloe Vera Herb Extracts With a Ratio of (1: 2)

Replication	Pre 25 %	Pre 50 %	Pre 100 %
1	TBUD	102	18
2	TBUD	81	29
3	TBUD	57	16
Min	TBUD	57	16
Max	TBUD	102	29
Mean	TBUD	80	21

Based on table 7, the results of the calculation of the number of germs on the plate after disinfection using a combination of gotu kola and aloe vera herb extracts with a ratio of 1: 2 at 25% concentration cannot be calculated, 50% concentration is 80 colonies/cm2, and 100% concentration is 21 colonies/cm2.

Table 8. Calculation of the Number of Germs on the Plate after Disinfection Using Combination of Gotu Kola and Aloe Vera Herb Extracts With a Ratio of (2: 1)

Replication	Pre 25 %	Pre 50 %	Pre 100 %
1	TBUD	TBUD	TBUD
2	TBUD	TBUD	TBUD
3	TBUD	TBUD	177
Min	TBUD	TBUD	177
Max	TBUD	TBUD	TBUD
Mean	TBUD	TBUD	TBUD

Based on table 8 that the results of the calculation of the number of germs on the plate after disinfection using a combination of gotu kola and aloe vera herb extracts with a ratio of 2: 1 at concentrations of 25%, 50% and 100% cannot be calculated.

Reduction in the Number of Germs on the Plate after Disinfection

Table 9. Calculation of Percentage Reduction in Number of Germs on the Plate after Disinfection Using Gotu Kola Extract

Replication	Pre	Post 25 %	Pre	Post 50 %	Pre	Post 100 %
1	>300	>300	>300	>300	>300	>300
2	>300	>300	>300	>300	>300	>300
3	>300	>300	>300	>300	>300	>300
Mean	>300	>300	>300	>300	>300	>300
(%)		-		-		-

Based on table 9, the calculation of the percentage of germ count reduction on dinner plates after disinfection using gotu kola extract at concentrations of 25%, 50% and 100% is 0%. %, 50 % and 100 % is 0%.

Table 10. Calculation of Percentage Reduction in Number Of Germs on Dinner Plate after Disinfection Using Aloe Vera Extract

Replication	Pre	Post 25 %	Pre	Post 50 %	Pre	Post 100 %
1	>300	162	>300	48	>300	17
2	>300	236	>300	30	>300	14
3	>300	100	>300	19	>300	11
Mean	>300	166	>300	32,3	>300	14
(%)		44, 6 %		89,2 %		95,3 %

Based on table 10, the calculation of the percentage reduction in the number of germs on the

dinner plate after disinfection using Aloe vera at a concentration of 25% is 44.6%, a concentration of 50% is 89.2% and a concentration of 100% is 95.3%.

Table 11. Calculation of Percentage Reduction in Number of Germs on Dinner Plate after Disinfection Using Combination of Gotu Kola and Aloe Vera Herb Extracts with a Ratio of (1:1)

Replication	Pre	Post 25 %	Pre	Post 50 %	Pre	Post 100 %
1	>300	>300	>300	>300	>300	>300
2	>300	>300	>300	>300	>300	>300
3	>300	>300	>300	>300	>300	224
Mean	>300	>300	>300	>300	>300	274,6
(%)		-		-		8,6 %

Based on table 10, the calculation of the percentage reduction in the number of germs on dinner dinner plates after disinfection uses a combination of gotu kola and aloe vera herb extracts with a ratio of 1:1 at a concentration of 25% and 50% is 0%, a concentration of 100% is 8.6%.

Table 12. Calculation of the Percentage Reduction in the Number of Germs on Dinner Plate After Disinfection Using a Combination of Gotu Kola and Aloe Vera Herb Extracts with a Ratio of (1: 2)

Replication	Pre	Post 25 %	Pre	Post 50 %	Pre	Post 100 %
1	>300	>300	>300	102	>300	18
2	>300	>300	>300	81	>300	29
3	>300	>300	>300	57	>300	16
Mean	>300	>300	>300	80	>300	21
(%)		-		73,3 %		93 %

Based on table 12, the calculation of the percentage of germ number reduction on dinner plates after disinfection using a combination of gotu kola and aloe vera herb extracts with a ratio of 1: 2 at 25% concentration is 0%, 50% concentration is 73.3% and 100% concentration is 93%.

Table 13. Calculation of the Percentage Reduction in the Number of Germs on Dinner Plate After Disinfection Using a Combination of Gotu Kola and Aloe Vera Herb Extracts with a Ratio of (2: 1)

Replication	Pre	Post 25 %	Pre	Post 50 %	Pre	Post 100
1	>300	>300	>300	>300	>300	>300
2	>300	>300	>300	>300	>300	>300
3	>300	>300	>300	>300	>300	177
Mean	>300	>300	>300	>300	>300	259
(%)		-		-		13,6 %

Based on table 13, the calculation of the percentage of germ number reduction on dinner plates after disinfection using a combination of gotu kola and aloe vera herb extracts with a ratio of 2: 1 at concentrations of 25% and 50% is 0%, 100% concentration is 13.6%.

The Effects of Using a Combination of Aloe Vera and Gotu Kola Herb Extracts on Germ Counts on Dinner Plates

Table 14. Analysis of the Effect of Using a Combination of Aloe Vera and Gotu Kola Herb Extracts on the Number of Germs on Dinner Plates

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 2	Pre 25% (lidahbuaya) - Post 25% (lidahbuaya)	125,00000	82,27393	47,50088	-79,37978	329,37978	2,632	2	,119
Pair 7	Pre 50% (lidahbuaya) - Post 50% (lidahbuaya)	267,66667	14,64013	8,45248	231,29857	304,03476	31,667	2	,001
Pair 9	Pre 50% (1 : 2) - Post 50% (1 : 2)	220,00000	22,51666	13,00000	164,06551	275,93449	16,923	2	,003
Pair 12	Pre 100% (lidahbuaya) - Post 100% (lidahbuaya)	286,00000	3,00000	1,73205	278,54759	293,45241	165,122	2	,000
Pair 13	Pre 100% (1 : 1) - Post 100% (1 : 1)	-11,33333	19,62991	11,33333	-60,09673	37,43006	-1,000	2	,423
Pair 14	Pre 100% (1 : 2) - Post 100% (1 : 2)	279,00000	7,00000	4,04145	261,61104	296,38896	69,035	2	,000
Pair 15	Pre 100% (2 : 1) - Post 100% (2 : 1)	41,00000	71,01408	41,00000	-135,40876	217,40876	1,000	2	,423

Based on table 14, the results of the analysis of the effect of using a combination of pegagan and aloe vera herb extracts using the Paired T Test statistical test show that in the treatment using Aloe Vera extract with a concentration of 25% obtained a sig value of 0.119> 0.05, in the treatment using a combination of gotu kola and aloe vera herb extracts with a ratio of 1:1 at 100% concentration obtained a result of 0.423> 0.05, in the treatment using a combination of gotu kola and aloe vera herb extracts with a ratio of 2: 1 at a concentration of 100% obtained a result of 0.423> 0.05.

The table above also shows that in the treatment using Aloe Vera extract with a concentration of 50% obtained a sig value of 0.001 <0.05, in the treatment using Aloe Vera extract with a concentration of 100% obtained a sig value of 0.000 <0.05, in the treatment using a combination of gotu kola and aloe vera herb extracts with a ratio of 1 : 2 at a concentration of 50% obtained a result of 0.003 < 0.05, in the treatment using a combination of gotu kola and aloe vera herb extracts with a ratio of 1: 2 at a concentration of 100% obtained a result of 0.001 < 0.05.

Homogeneity Test

Table 15. Homogeneity Test on the Variation of Concentration of the Combination of Gotu Kola and Aloe Vera Herb Extracts

Test of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
Hasil Desinfeksi	Based on Mean	6,539	14	30	,000
	Based on Median	1,223	14	30	,310
	Based on Median and with adjusted df	1,223	14	4,932	,444
	Based on trimmed mean	5,925	14	30	,000

based on table 15, the homogeneity test results show that the sig value is 0.000 which means sig <0.05. This study aims to determine at what concentration the combination of Gotu kola (Centella Asiatica (L.) Urban) and Aloe vera extracts as a disinfectant. This study used samples of gotu kola and aloe vera herb extracts.

Gotu kola is a plant that can be used as medicine. One of the benefits obtained from gotu kola is its antibacterial properties. Gotu kola contains antibacterials including saponnins, tannins, alkaloids and flavanoids. Aloe vera is used as a natural disinfectant because it has antibacterial properties. Aloe vera contains complex compounds of anthraquinones, tannins, flavonoids, tannins and saponins.

The method used for extraction is by maceration because maceration is a simple way of extracting. Research conducted using herbaceous simplisia gotu kola as much as 10 kg which was macerated with 70% ethanol so that a thick extract of 1,360 grams was obtained. Research conducted using aloe vera meat as much as 8 kg which was macerated with 98% ethanol so that a thick extract of 1,050 grams was obtained.

Characterization of simplisia and extracts is an initial process carried out to determine the quality of a simplisia and extract [15]. Characterization of simplisia carried out on gotu kola herb in the form of an organoleptic test which shows the shape of a coarse powder with a light green color and aromatic odor. Microscopic tests showed the presence of perisperm cross section. The purity test

and stabilization rules show no change in color and odor in the simplisia, no insects and other impurities in the simplisia after being stored for several days in a glass container.

In the characteristics of gotu kola herb extract in this study in the form of an organoleptical test, it shows the form of a thick extract with a blackish brown color and a distinctive odor of the extract. The drying shrinkage determination test showed a result of 6%. The total ash content determination test showed a result of 18.75%. While the characteristics of aloe vera extract in this study in the form of organoleptical tests show the form of thick extracts with a dark brown color with a distinctive odor of extracts. The drying shrinkage determination test shows the result of 14.5%. The total ash content test showed a result of 8%.

The calculation of the germ number before being treated using a combination of gotu kola and aloe vera herb extracts aims to determine the germ number on the sample dinner plate being examined. The germ number before treatment is used as a comparison with the germ number after treatment, so that it is known that there is an increase or reduction [17].

Based on the results of the calculation of the average number of germs on dinner plate before being treated with a concentration of 25%, 50% and 100%, namely TBUD (cannot be calculated) or> 300. The Decree of the Minister of Health of the Republic of Indonesia Number 1096 of 2011 concerning Sanitary Hygiene of Caterers states that the requirement for the germ count on dinner plates is 0 (zero). is 0 (zero). Based on the results of the calculation of the germ number on the sample plate before being treated using a combination of gotu kola and aloe vera herb extracts, it does not meet the requirements.

The number of germs on the sample dinner plates that still exceed the required value is caused by several things related to the way the plates are handled such as washing techniques, the source of water used for washing and how to store the plates [17].

Based on the results of the calculation of the germ number after disinfection using aloe vera extract with a concentration of 25%, namely 166 colonies / cm2, 50% concentration, namely 32.3 colonies / cm2, and 100% concentration, namely 14 colonies / cm2. With a percentage reduction in the number of germs with each concentration is 25% concentration of 44.6%, 50% concentration of 89.2% and 100% concentration of 95.3%.Based on the results of the calculation of the number of germs after disinfection using a combination of extracts of gotu kola herb and aloe vera with a ratio (1: 2) at a concentration of 25%, namely TBUD (Cannot be calculated), a concentration of 50%, namely 80 colonies / cm2, and a concentration of 100%, namely 21 colonies / cm2.

% is 21 colonies / cm2. With a percentage reduction in the number of germs with each concentration is 25% concentration of 0%, 50% concentration of 73.3% and 100% concentration of 93%.

This is in line with research on the use of kedondong leaf extract against the number of germs on the plate which shows that there is a reduction in the number of germs before and after being treated is a concentration of 4% by 86.25%, a concentration of 8% by 66.04%, and a concentration of 12% by 63.24% [17].

The Decree of the Minister of Health of the Republic of Indonesia Number 1096 of 2011 concerning Sanitary Hygiene of Caterers states that the germ number requirement on tableware is 0 (zero). Based on these requirements, the number of germs on the plate after being treated with a combination of gotu kola herb extract and aloe vera with a concentration of 25%, 50%, and 100%, still exceeds the requirement value. However, the reduction in the number of germs is quite good, namely at a concentration of 100%, a reduction in germs is obtained by 93%.

The statistical test used to analyze bivariate data is the Paired T Test. Variables are said to be related or significant if the sig value is <0.05) [17]. The results of the analysis of the effect of using a combination of pegagan herb extract and aloe vera using the Paired T Test statistical test showed that in the treatment using Aloe Vera extract with a concentration of 25% obtained a sig value of 0.119> 0.05, in the treatment using a combination of pagagan herb extract and aloe vera with a ratio of 1: 1 at a concentration of 100% obtained a result of 0.423> 0.05, in the treatment using a combination of pegagan herb and aloe vera with a ratio of 2 : 1 at a concentration of 100% obtained a result of 0.423> 0.05 which means there is no difference in the number of germs on the plate before and after disinfection of the three concentrations. This is because the number of germs from before disinfection

reduction insignificantly, which can be caused by the content in the combination of gotu kola herb extract and aloe vera working less than optimal. This causes microorganisms on the dinner plate not to be killed optimally.

The results of the analysis of the effect of using a combination of gotu kola herb extract and aloe vera using the Paired T Test statistical test showed that in the treatment using aloe vera extract with a concentration of 50% obtained a sig value of 0.001 <0.05, in the treatment using aloe vera extract with a concentration of 100% obtained a sig value of 0.000 <0.05, in the treatment using a combination of gotu kola herb extract and aloe vera with a ratio of 1 : 2 at a concentration of 50% obtained a result of 0.003 < 0.05, in the treatment using a combination of pagagan herb extract and aloe vera with a ratio of 1: 2 at a concentration of 100% obtained a result of 0.001 <0.05 which means there is a difference in the number of germs on the plate before and after disinfection of the four concentrations. This is because the number of germs from before disinfection reduction significantly.

Multivariate data analysis using statistical tests was used to determine differences in each concentration. The statistical test used is ANOVA, which is to determine whether there is a significant difference in the concentration variation of the combination of gotu kola herb extract and crocodile liadah against the number of germs on the dinner plate. ANOVA test can be done if the requirement of homogeneous data (Test of Homogeneity of Variances) has been met.

Based on the results of the homogeneity test, it shows that the sig value is 0.000, which means that sig <0.05 means that the variance data is not homogeneous so it does not meet the requirements for the ANOVA test. This can be caused by many factors, both technically research and data processing.

Kaffah (2019) mentions the causes of insignificant statistical test results due to several things, including errors in data entry, statistical models that are not in accordance with research data, small sample sizes, anaisis requirements that are not complied with, measuring instruments that are less valid and reliable, and other causes [17].

Kaffah (2019) states that gotu kola herb and aloe vera contain compounds that function as antimicrobials, these compounds include alkaloids, flavonoids, saponins and tannins. Alkaloids interfere with the constituent components of peptidoglycan in bacterial cells, so that the cell layer is not formed intact and causes cell death. Flavonoids form complex compounds against bacterial cell proteins and damage cell membranes beyond repair. Tannins can inhibit cell metabolism, disrupt cell wall synthesis, and proteins by interfering with enzyme activity. Saponins react with porins by forming strong polymeric bonds resulting in porin damage, as a result bacterial cells lack nutrients and die [17].

Plezar and Chan (2008) say the presence of other organic materials can significantly reduce the effectiveness of antimicrobial chemicals by activating these materials and other causes. This study utilizes disinfectant compounds in gotu kola and aloe vera herbs without purification, so it is likely that many other compounds are carried in the extract [18].

4. CONCLUSION

The combination of gotu kola and aloe vera herb extracts is effective as a natural disinfectant. Based on the results of the study, the combination of gotu kola and aloe vera herb extract can be used as a natural disinfectant in a ratio of 1: 2 with a concentration of 100% resulted in a reduction in the number of germs by 93%.

REFERENCES

[1] Legowo, Lindawaty Valentina. (2012). Koefisien Fenol Beberapa Pembersih Lantai Terhadap Staphylococcus aureaus dan Escherichia coli. Undergraduate thesis, Universitas Kristen Maranatha

[2] Widyastari, T., Harlia, E., & Marlina, E.T. (2015). Efektifitas Kulit Daun Lidah Buaya sebagai Desinfektan Alami terhadap Daya Hambat dan Penurunan Jumlah Bakteri Total di Ruang Penampungan Susu. Jurnal Universitas Padjadjaran : Bandung.

[3] Ramadhan, N. S., Rasyid, R., & Sy, E. (2015). Daya Hambat Ekstrak Daun Pegagan (Centella asiatica) yang Diambil di Batusangkar terhadap Pertumbuhan Kuman Vibrio cholerae secara In Vitro. 5. Fakultas Kedokteran Universitas Andalas : Padang

[4] Permana, O. R., & Lestari, L. (2014). Uji Efektivitas Antimikroba Sari Lidah Buaya (Aloe Vera) Terhadap Bakteri Escherichia Coli. 4. Jurnal Fakultas Kedokteran Universitas Swadaya : Cirebon
[5] Listiyaningsi, A., Rukmana, R.M. (2015). Potensi Antibakteri Ekstrak Etanolik Kulit Daun Lidah Buaya (Aloe vera) Terhadap Bakteri Pseudomonas aeruginosa. Fakultas Ilmu Kesehatan, Universitas Setia Budi
[6] Azzahra, F., & Hayati, M. (2019). Uji Aktivitas Ekatrak Daun Pegagan (Centella asiatica (L). Urb) Terhadap Pertumbuhan Streptococcus mutans. B-Dent, Jurnal Kedokteran Gigi Universitas Baiturrahmah, 5(1), 9–19. https://doi.org/10.33854/jbd.v5i1.133
[7] Habibi, M. W., Setiawan, M. A., Ulfa, R. M., & Istiqomah, L. (2018). Efektivitas Ekstrak Daun Pegagan (Centella asiatica (L.) Urban) terhadap Pertumbuhan Jamur Aspergillus flavus. CHEESA: Chemical Engineering Research Articles, 1(2), 58. https://doi.org/10.25273/cheesa.v1i2.3168
[8] Widiastuti R., Nurhaeni F., Luluk, M,D., & Setyo, W,G. (2013). Potensi Antibakteri dan Anticandida Ekstrak Etanol Daun Pegagan (Centella asiatica (L.) Urb.). Poltekes Bhakti Setya Indonesia : Yogyakarta Indonesia
[9] Nurmidin, M. F., Pinontoan, O. R., & Kandou, G. D. (2016). Efektivitas Daun Jeruk Purut (Citrus hystrix) Dalam Menurunkan Angka Mikroba pada Piring Makan Penjual Makanan Gerobak Di Kelurahan Tuminting. ikmas
[10] Kementerian Kesehatan R.I. (1996).Undang - Undang Nomor 7 Tahun 1996 Tentang Pangan . Jakarta.
[11] Fatmalia, N., Sunariska, D. E. (2018). Uji Efektivitas Rebusan Daun Suruhan (Peperomia Pellucida) terhadap Pertumbuhan Bakteri Staphylococcus aureus. Jurnal Sains Akademi Analisis Kesehatan Delima Husada Gresik
[12] Cowan, M.M. 1999. Plant Product as Antimicrobial Agents, Clinical Microbiology Reviews.
[13] Harborne, J. B. (1987). Metode Fitokimia: Penuntun Cara Modern Menganalisis Tumbuhan, Diterjemahkan oleh Kosasih Padmawinata dan Iwang Soediro, Institut Teknologi Bandung, Bandung.
[14] Febriyenti, F., Suharti, N., Lucida, H., Husni, E., & Sedona, O. (2018). Karakterisasi dan Studi Aktivitas Antioksidan dari Ekstrak Etanol Secang (Caesalpinia sappan L.). JSFK (Jurnal Sains Farmasi & Klinis)
[15] Departemen Kesehatan RI, (2000). Parameter Standar Umum Ekstrak Tumbuhan Obat Cetakan Pertama, 3-11, 17-19, Dikjen POM, Direktorat Pengawasan Obat Tradisional.
[16] Fitriantari, A. R. (2017). Kajian Aktivitas Kombinasi Ekstrak Etanol Daun Binahong (Anredera cordifolia (Ten.) Steenis) dan Daun Lidah Buaya (Aloe barbadensis Miller) Terhadap Staphylococcus aureus ATCC 25923 (Doctoral dissertation, Universitas Setia Budi Surakarta).
[17] Kaffah, Silmi., dkk. (2019). Pengaruh Pemakaian Ekstrak Daun Kedondong (Spandias dulcis) sebagai Desinfektan Alami Dalam Menurunkan Angka Kuman Pada Piring Makan. Poltekes Kemenkes Semarang, Semarang
[18] Pleczar, J. M & Chan, E. C. S. (2008). Dasar-dasar Mikrobiologi. Universitas Indonesia : Jakarta