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TELANG FLOWER KOMBUCHA SOLID BATH SOAP AS A HALAL AND ANTIMICROBIAL PHARMACEUTICAL BIOTECHNOLOGY PRODUCT

Firman Rezaldi[1] Meylissa Servita Surya[2] Vevi Maritha[3]
Iin Hasan Ginanjar[4] Rina Nurmaulawati[5]
[1]Program Studi Doktor Ilmu Pertanian, Sekolah Pasca Sarjana, Universitas Sultan Ageng Tirtayasa, Serang, Banten, Indonesia
[2]Staff Keuangan, Universitas Mangku Wiyata, Cilegon, Banten, Indonesia
[3]Program Studi Farmasi, Fakultas Sains dan Ilmu Kesehatan, Universitas PGRI, Madiun, Jawa Timur, Indonesia
[4]Kepala Bagian Akademik, Universitas Mangku Wiyata, Cilegon, Banten, Indonesia
[5]Program Studi Farmasi, STIKes Bhakti Husada Mulia, Madiun, Jawa Timur, Indonesia
Correspondence Author: firmanrezaldi890@gmail.com

Abstract: *Excellent health is part of having immunity which tends to be stable, where normal flora is the most important parameter in increasing the body's resistance. Normal flora that is not well controlled can also increase the body's immune system to become threatened so that disease and infection have the potential to attack each individual. Smelly armpits are a sign of disease or Staphylococcus hominis infection. Women's intimate organs experiencing vaginal discharge is a sign of disease or infection caused by Candida albicans. The solution that can be offered to inhibit the growth of these two microbes is to bathe using herbal soap that is environmentally friendly and antimicrobial, namely solid bath soap made from the active ingredient of telang flower kombucha.This research aims to produce environmentally friendly pharmaceutical biotechnology products in the form of solid bath soap formulations and preparations made from the active ingredient of telang flower kombucha. This research is a laboratory experiment by making a solid bath soap base without active substances and a solid bath soap made from the active ingredient of butterfly pea flower kombucha with sugar concentrations including 20%, 30% and 40%.This research has proven that solid bath soap with the active ingredient telang flower kombucha at a concentration of 40% is significantly different as a pharmaceutical biotechnology product in inhibiting the growth of the two test microbes, both bacteria that cause underarm odor and pathogenic fungi that cause vaginal discharge in women's intimate organs at concentrations of 20% and 30%. based on one-way ANOVA analysis with a P value <0.05.This research can be proven and concluded that telang flower kombucha solid bath soap at a concentration of 40% is an effective treatment as a pharmaceutical biotechnology product and as an antimicrobial for both bacteria that cause underarm odor and pathogenic fungi that cause vaginal discharge in women's intimate organs.*

Keywords: *Pharmaceutical Biotechnology; Solid Body Wash; Bacteria; Fungi.*

INTRODUCTION

Food, supplements, medicines and cosmetics are components that are needed in human daily life, whether in health or illness.Apart from playing an important role in improving good health, these four components also need to be guaranteed to be halal when the process is applied in everyday life.Halal Product Guarantee in Indonesia is a guarantee provided and protected by the government to protect Muslim consumers.Regarding halal food, the government guarantees that Muslim communities have their rights in producing and consuming food. Rules related to halal food are described in Law no. 34 of 2014 concerning Halal Product Guarantee (UUJPH).

The implementation of these legal regulations is synergized between the community, in this case consumers, entrepreneurs or what we call producers, and the Government as the policy holder (Ikomatussaniah & Sariyah, 2023).

One functional food ingredient based on fermented tea that can improve the immune system is butterfly pea flower kombucha according to Rezaldi et al., 2022 ; Rezaldi *et al*., 2023).Butterfly flower kombucha, as reported by Rezaldi et al., (2021), apart from being able to be used as a functional food, can also be developed as an active ingredient in medicines and cosmetics that are halal from a biotechnology perspective.There are properties of butterfly pea flower kombucha (Clitoriaternatea L) as an antibacterial source (Rezaldi et al., 2021; Fadillah et al., 2022; Kusumiyati et al., 2022; Mu'jijah et al., 2023), antifungal source (Rezaldi et al., 2022 ; Pamungkas et al., 2022 ; Rezaldi et al., 2023), a source of anti-cholesterol (Rezaldi et al., 2022 ; Kolo et al., 2022 ; Waskita et al., 2023 ; Setiawan et al., 2023; Fathurrohim et al., 2023) also opens up opportunities for butterfly pea flower kombucha to be applied as an active ingredient in medicines and cosmetics from a halal and environmentally friendly biotechnology perspective.

So far, the use of butterfly pea flower kombucha as an active medicinal ingredient has been carried out by Margarisa et al., (2023) where the results of their research have proven that butterfly pea flower kombucha is a probiotic drink that can be used as a therapeutic agent for female mice to improve their morphometry after being given cigarette smoke. The results of this research are also in line with the results of research conducted by Rezaldi et al., (2024) where in the results of their research it has also been proven that butterfly pea flower kombucha is a probiotic drink that can be used as a therapeutic agent for male mice to increase sperm cell production after exposed to cigarette smoke.Meanwhile, the potential of butterfly pea flower kombucha as an active ingredient in cosmetics has been researched by Rezaldi et al., (2022) where the results of their research also proved that liquid bath soap with the active ingredient of butterfly pea flower kombucha fermentation solution has the potential to act as an antibacterial for Staphylococcus aureus.The results of research conducted by Rezaldi et al., (2023) also prove that liquid bath soap made from the active ingredient telang flower kombucha is a pharmaceutical biotechnology product that is able to inhibit the growth of Staphylococcus epidermidis and Pseudomonas aeruginosa.The results of research conducted by Fatonah et al., (2022) have proven that liquid kombucha butterfly soap has the potential to inhibit the growth of Escherichia coli bacteria.The results of research also carried out by Pamungkas et al., (2022) proved that telang flower kombucha liquid bath soap has the potential to be an antifungal in inhibiting the growth of Trycophyton rubrum and Trycophyton mentagrophytes.Similar research results have also been carried out by Kolo et al., (2022) who have proven that bath soap with the active ingredient telang flower kombucha is a pharmaceutical biotechnology product which plays an important role as an antibacterial for Staphylococcus capitis, Bacillus cereus, and Pantoeadispersa.

The increasingly inflamed problem of disease and infection makes it a challenge to produce the latest innovations for telang flower kombucha to be used in the field of pharmaceutical biotechnology which is quite environmentally friendly as an active ingredient in medicines and environmentally friendly cosmetics which are designed to be antimicrobial (Puspitasari et al., 2023).The results of research conducted by Nurmalawati et al., (2022) have proven that mouthwash with the active ingredient kombucha butterfly pea flower is able to inhibit microbial growth, both as an antibacterial for mutant Streptococcus and Candida albicans.

In line with the results of research conducted by Sofianti et al., (2023) it has been proven that the telang flower kombucha mouthwash is able to inhibit the growth of Staphylococcus aureus bacteria.The results of recent research regarding the potential of butterfly pea flower kombucha as an active ingredient in medicines and cosmetics encouraged the author to conduct research on solid bath soap with the active ingredient butterfly pea flower kombucha to inhibit the growth of bacteria that cause underarm odor and pathogenic fungi that cause vaginal discharge in women's intimate organs.

The main thing underlying the title of this research is that the results of previous research prove that liquid bath soap with the active ingredient fermented kombucha solution of telang flower has the potential as a pharmaceutical biotechnology product in inhibiting the growth of Staphylococcus hominis bacteria, namely the bacteria that cause underarm odor (Putra et al., 2023) and the growth of pathogenic fungi, namely the Candida albicans species, causes vaginal discharge in women's intimate organs (Ma'ruf et al., 2022).The secondary metabolite content such as alkaloids, flavonoids and saponins contained in telang flower kombucha has the potential to make active ingredients for medicines and cosmetics which can be used or designed to inhibit microbial growth (Abdilah et al., 2022).

METHOD

This research is an experimental laboratory, namely by providing marketed solid bath soap as a positive control, solid bath soap base without the active ingredient of butterfly pea flower kombucha, solid bath soap base with the active ingredient of telang flower kombucha at sugar concentrations of 20%, 30%, and 40%. % which is designed as an antibacterial that causes underarm odor, namely Staphylococcus hominis, and as an antifungal pathogen that causes vaginal discharge in women's intimate organs, namely Candida albicans.

RESEARCH TOOLS AND MATERIALS

The tools used in this research were a spatula, blender, cupporcelain, measuring cup, dropper, evaporator cup, spatula, test tube, moldsoap, and soap packaging. The materials used in this research were a fermented solution of kombucha butterfly pea flower (Clitoriaternatea L), olive oil, coconut oil, NaOH,Cocaimid DEA, distilled water and perfume.

Formulation and Preparation of Telang Flower Kombucha Solid Bath Soap (Clitoriaternatea L)

A series of solid bath soap formulas with the active ingredient of butterfly pea flower kombucha fermentation solution include Butterfly flower kombucha fermentation solution with a sugar concentration of 20%, 30% and 40% as the active ingredient which is designed to inhibit the growth of bacteria that cause underarm odor and pathogenic fungi that cause vaginal discharge. female intimate organs, 30 grams of coconut oil in each formula as a soap hardener and a fairly stable foam producer, 5 grams of olive oil in each formula which plays an important role as a moisture enhancer, 10 grams of NaOH in each formula which plays an important role as a basic ingredient for solid bath soap, 20 grams of Cocaimid DEA in each formula which plays an important role in maintaining foam stability, 2 drops of perfume in each formula as a barrier to rancid odors, and 500 mL of distilled water in each formula. each formula as a solvent.The composition of the formulation and preparation of solid bath soap with the active ingredient of butterfly pea flower kombucha fermentation solution is listed in detail in table 1 below.

Table 1 Formulation and preparation of solid bath soap with the active ingredient fermented solution of butterfly pea flower kombucha (Clitoriaternatea L).

Composition	Unit	Formula			
		F0	F1	F2	F3
Telang Flower Kombucha Liquid	%	0	20	30	40
Coconut Oil	G	30	30	30	30
Olive Oil	G	5	5	5	5
NaOH	G	10	10	10	10
Aquadest	G	25	25	25	25
CocaimidDEA	G	20	20	20	20
Parfume		Qs	qs	qs	Qs

Information :

F0 :Solid bath soap base without active substances

F1 :Solid bath soap base with active ingredient 20% butterfly pea flower kombucha

F2 : Solid bath soap base with active ingredient 30% butterfly pea flower kombucha

F3 : Solid bath soap base with active ingredient 40% butterfly pea flower kombucha

Working Procedure for Making Kombucha Butterfly Butterfly Soap (Clitoriaternatea L)

The initial stage in this work procedure is preparing the raw materials and additional materials needed as well as the tools needed then weighing the materials according to the formula listed in table 1 above.The second working step is mixing and heating coconut oil and olive oil at a temperature of 60 to 70^{o}C in a water bath.The third stage of work is mixing NaOH and distilled water and stirring until dissolved.The fourth working step is adding the second and third working procedures then stirring until homogeneous.The fifth working step is to add cocaimid DEA then stir until it dissolves in a homogeneous condition to be cooled at a temperature of 50 to 60^{o}C.The sixth working step is to add the active ingredient of solid bath soap, namely the fermented solution of butterfly pea flower kombucha (Clitoriaternatea L), then stir slowly, add distilled water, stir again slowly until it is homogeneous, wait until it thickens and forms a solid bath soap paste, and stop stirring.The final working step is to add 2 drops of perfume, pour the soap into the mold, let it harden for 1 to 2 days, and remove the soap from the mold to be ready to be packaged (Rezaldi et al., 2024).

Testing the Inhibitory Power of Solid Bath Soap Against the Growth of Staphylococcus hominis and Candida albicans

Testing the growth inhibition of Staphylococcus hominis and Candida albicans measured the diameter of the inhibition zone of each formulation and solid bath soap preparation with the active ingredient of telang flower kombucha fermentation solution using the disc diffusion method. And measuring the clear zone as one of the inhibitory zones for antimicrobial agents both against the growth of bacteria that cause underarm odor, namely Staphylococcus hominis, and pathogenic fungi that cause vaginal discharge in women's intimate organs, namely Candida albicans. Testing in this study of solid bath soap made from the active ingredient of the fermented solution of butterfly pea flower kombucha (Clitoriaternatea L) used sugar concentrations of 20%, 30% and 40%. Referring to previous

research, each of these concentrations plays an important role as an antibacterial (Subagiyo et al., 2022) and antifungal (Rezaldi et al., 2022).

Testing of the inhibitory power of the growth of the two test microbes was carried out and grouped based on various inhibition zone criteria (Pertiwi et al., 2022) where the inhibition zone criteria include if the resulting inhibition zone value is >20 mm, then it has a very strong category, if the zone If the resulting inhibition zone is 10-20 mm, then it is in the strong category, if the resulting inhibition zone is 5-10 mm, then it is in the medium category, if the resulting inhibition zone criteria is 1-5 mm, then it is in the weak category, and if the zone criteria are The resulting resistance is <5 mm, so it is in the very weak category (Pertiwi et al., 2022).

Data Analysis

Data generated on each average diameter of the inhibition zone for the growth of Staphylococcus hominis and Candida albicans bacteria were analyzed via one-way ANOVA. If each variable produces a P value <0.05, it will be continued via further testing in the form of post hoc analysis. (Ma'ruf et al., 2022 ; Rezaldi et al., 2024 ; Fadillah et al., 2023).

RESULT AND DISCUSSION

The results of this research have proven that the formulation and preparation of solid bath soap with the active ingredient of butterfly pea flower kombucha fermented solution correlates positively as an antimicrobial both against the growth of bacteria that cause underarm odor with the species Staphylococcus hominis and against pathogenic fungi that cause vaginal discharge in women's intimate organs with the species Candida albicans. The results of this research are listed in table 1 below.

Table 1. Average diameter of the inhibition zone in formulations and preparations of butterfly pea flower kombucha solid bath soap as an antimicrobial and pos hoc test

Microbe Name	Average diameter of inhibition zone of solid kombucha butterfly soap 20%	The average diameter of the inhibition zone of solid kombucha butterfly soap is 30%	The average diameter of the inhibition zone of solid kombucha butterfly soap is 40%
Staphylococcus hominis	8.72[a]	9.00[a,b]	12.25[c,d]
Candida albicans	6.82[a]	7.07[a,b]	10.00[c,d]

Information :
The same letter notation indicates there is no significant difference.
Letter notations that are not the same indicate significant differences.

Table 1 above has proven that solid bath soap made from the active ingredient of butterfly pea flower kombucha fermentation solution correlates positively as an antimicrobial. At concentrations of 20% and 30% there are moderate inhibition zone criteria, while at a concentration of 40% there are strong inhibition zone criteria. This is in accordance with the results of research conducted by Rezaldi et al., (2022) which stated that the higher the substrate concentration in butterfly pea flower kombucha, the stronger its potential as an antibacterial and antifungal.Based on the post hoc analysis test contained in table 1 above, it has been proven that telang flower kombucha solid bath soap at a concentration of 20% and

30% is not significantly different as an antimicrobial, both in inhibiting the growth of Staphylococcus hominis bacteria as bacteria that cause underarm odor and pathogenic fungi with Candida species. albicans is a pathogenic fungus that causes vaginal discharge in women's intimate organs.Similar research results were carried out by Rezaldi et al., (2024) which proved that liquid kombucha bath soap from butterfly pea flowers was able to inhibit the growth of Candida albicans isolated from female sexual workers at concentrations of 20%, 30% and 40%.

Solid bath soap with the active ingredient of butterfly pea flower kombucha fermentation solution in this research is one of the pharmaceutical biotechnology products that is halal for application in daily life. This is because butterfly pea flower kombucha has been proven in previous research to be antimicrobial, both in inhibiting the growth of gram-positive and negative bacteria as well as the growth of pathogenic fungi.Recent research has also been proven on the agricultural side where telang flower kombucha, apart from being able to be applied as an active ingredient in halal medicines and cosmetics, can also be developed as an organic liquid fertilizer for the waste after adding EM4 (Rezaldi et al., 2024; Hariadi et al., 2023 ; Rezaldi &Hidayanto, 2022 ; Saddam et al., 2022 ; Fathurrohim et al., 2022) as well as natural spray preparations as inhibitors of the growth of the fungus Fusarium oxysporum which causes wilt in horticultural commodity plants (Rezaldi et al., 2023).

CONCLUSION

Telang flower kombucha solid bath soap at a concentration of 40% is an effective treatment as a pharmaceutical biotechnology product and as an antimicrobial for both bacteria that cause underarm odor and pathogenic fungi that cause vaginal discharge in women's intimate organs.

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