

DEVELOPMENT OF VCO – BASED ANTIBACTERIAL SOAP WITH CINNAMON BARK AND PINEAPPLE PEEL EXTRACTS

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01 BACKGROUND

The skin is the **body's primary defense against external exposures such as UV rays and bacteria**. Exposure to bacteria like E. coli and Staphylococcus aureus can cause various skin problems, including acne and boils. **Herbal soaps** with antibacterials from natural ingredients can be used as an alternative to replace chemical antibacterial soaps.



Cinnamon Bark contains the **cinnamaldehyde, eugenol, coumarin compounds**



Pineapple Peel contains the **flavonoid, saponin, tanin**

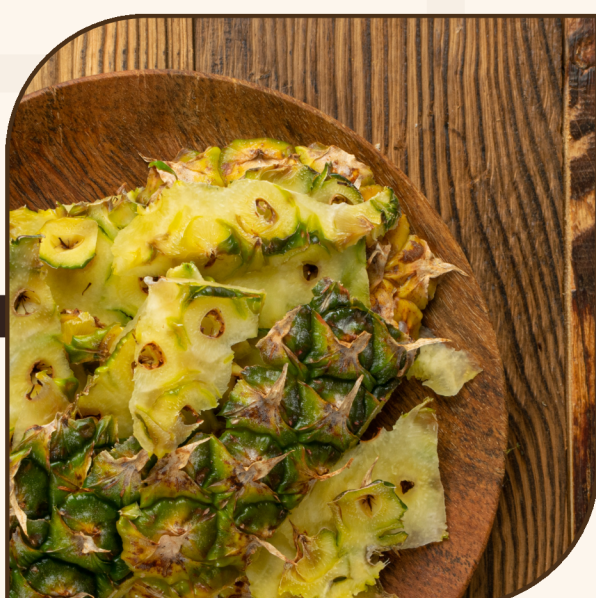
02 PURPOSE

- To determine the best VCO-based solid soap by:
- Using cinnamon bark and pineapple peel extracts
 - Conducting physical and antibacterial evaluations
 - Comparing VCO vs palm oil as the soap base

03 METHOD



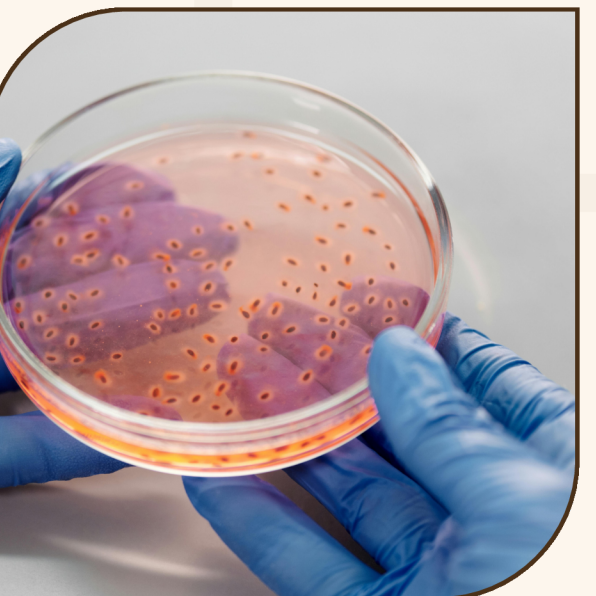
Extraction of Cinnamon Bark



Extraction of Pineapple Peel



VCO Production



Anti Bacterial Test



Evaluation Test



Soap Formulation

04 SOLID SOAP FORMULATION

Materials	F1 (%)	F2 (%)	F3 (%)	F4 (%)	F5 (%)	Function
Extraction Cinnamon Bark (gr)	-	-	1	2	3	active antibacterial
Extraction Pineapple Peel (gr)	-	-	3	6	9	Antibacterial Agent
VCO (mL)	-	22	22	22	22	Oil Base
Palm Oil (mL)	22	-	-	-	-	Oil Base
NaOH 30 % (mL)	22	22	22	22	22	Alkaline Base
Stearic Acid (gr)	4	4	4	4	4	Hardening Agent
Cocamidopropylbetaine (mL)	5	5	5	5	5	Amphoteric Sulfate
NLS (mL)	4	4	4	4	4	Anionic Sulfate
Glycerin (mL)	14	14	14	14	14	Humectant
Perfume (mL)	Qs	Qs	Qs	Qs	Qs	Fragrance
Distilled Water (mL)	Ad 100	Ad 100	Ad 100	Ad 100	Ad 100	Solvent

06 CONCLUSION

The results of the anti bacterial test of solid soap formulation :

- The **best soap formulation** was obtained from **a combination of cinnamon bark extract (3%) and pineapple peel extract (9%)** with a total concentration of 12% **using a VCO (Virgin Coconut Oil) base**.
- Solid soap** containing this combination of the two extracts demonstrated strong to very strong antibacterial activity against test bacteria.
- The use of **VCO as a base** has been shown to significantly **impact the quality and effectiveness of solid soap preparations**.

05 RESULT

Phytochemical Screening Result :

Compound	Extraction Cinnamon Bark	Extraction of Pineapple Peel
Alkaloids	Yes	Yes
Flavonoids	Yes	Yes
Tannin	Yes	Yes
Triterpenoids	Yes	Yes
Saponins	Yes	Yes
Cinnamaldehyde	Yes	No

Solid Soap Foam Stability Evaluation Results :

Formulation	Before (cm)	After (cm)	% of foam lost	Result
F1	7	5	28,57	71,43%
F2	7	6,2	11,43	88,57%
F3	7	6,2	11,43	88,57%
F4	7	6,3	10,00	90,00%
F5	7	6,5	7,14	92,86%

Evaluation Results of Antibacterial Activity of Solid Soap :

Formulation	Escherichia Coli				Staphylococcus Aureus			
	D1 (mm)	D2 (mm)	Inhibition zone	Information	D1 (mm)	D2 (mm)	Inhibition zone	Information
Positive Control	30	30	24	Very Strong	22	23	16,5	Strong
Negative Control	-	-	-	-	-	-	-	-
F1	-	-	-	-	-	-	-	-
F2	20	21	14,5	Strong	13	13	8	Medium
F3	27	26	20,5	Strong	20	20	14	Strong
F4	27	27	21	Very Strong	24	24	16,5	Strong
F5	29	25	21	Very Strong	22	22	17,5	Strong

SPSS Analysis Results Data Using the Kruskal Wallis Method :

Soap microbial test	Kruskal wallis
E. coli bacterial inhibition zone	0.371
S. aureus bacterial inhibition zone	0.371

06 Discussion

VCO-based solid soap with cinnamon bark and pineapple extracts showed: **Homogeneous texture, Safe pH (9–11), High foam stability, Strong antibacterial activity against E. coli & S. aureus**. VCO base outperformed palm oil, producing better foam and antibacterial effects. Statistical analysis ($p > 0.05$) showed no significant difference between formulas, but VCO enhanced overall soap quality.