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## Formulation, Development and Evaluation of Antifungal *Betel Leaf* Polyherbal Soap



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### ABSTRACT

Now a days, a fungal infection is the most prevalent tissue. The emphasis of the current endeavour is the development of herbal antifungal soap because commercially available soaphas minimal adverse effects on sensitive skin and is more expensive. At the moment, we are using *Piper betel* leaf, also called betel leaf (khaupan). Ayurvedic medicine from ancient India lists several of its medical benefits, including its potency as an antifungal agent. The goal of the current investigation was to assess the secondary metabolite that supports its antifungal action. In the current work, we have developed a soap that fights fungus using the synergistic effects of betel leaf extract. The many batches were created to investigate the influence of the soap base during formulation, and the best batch was then used for herbal formulation of soap. The formulation was assessed and found to have high clarity. Compared to F1 and F2, the formulation of the F3 batch exhibits the best performance for the evaluation parameters. The batch formulation of F3 that was optimized produced good results.



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## INTRODUCTION

The most frequent type of skin infection caused by fungi demands intensive care for both immediate treatment and long-term maintenance of healthy skin. The majority of commercial soap on the market today contains chemical ingredients that have antibacterial activity and may have depilatory effects on skin infections. The current issue is that the majority of people are unaware of the long-term effects of using commercial soaps. People are now more likely to employ herbal formulations due to the downsides of commercial soap<sup>(1)</sup>.

Asians frequently use *Piper betle* (also known as betel leaf) as a mouth refresher after meals. In Bangladesh, India, Sri Lanka, and other Southeast Asian nations, this plant is widely grown. A strong antibacterial activity by the release of secondary metabolites was demonstrated in prior research on the betel leaf, root, and entire extract. A significant phenolic component of betel leaves called hydroxyl chavicol has been shown to have anti-*Candida* spp. action. These plant extracts are also used to treat gastrointestinal problems, herpes simplex virus type-1, cervicitis vaginitis, urinary tract infections, and skin infections. Additionally, the plant extract can function as an anti-inflammatory, antioxidant, chemopreventive, anti-platelet, and antithrombotic agent<sup>(2)</sup>.

Betel leaf has been referred to as an aromatic stimulo-carminative, astringent, and aphrodisiac since ancient times. The leaf secretes an aromatic volatile oil that contains chavicol, a phenol with potent antibacterial effects. The alkaloid arakene has several characteristics that are similar to those of cocaine. Chewing betel chewing produces a lot of saliva, temporarily dulls taste perception, and stimulates both the muscles and the mind<sup>(3)</sup>.

Scientific research on the leaf of this plant reveals that it possesses many beneficial bioactivities and its extract from betel leaves has a great potential to be used in developing commercial products. Due to the numerous benefits, betel vine is grown for its leaves. The best conditions for commercial betel vine cultivation are those of tropical rain forests, which provide cool shade, considerable humidity and an adequate supply of soil moisture like Indonesia, Malaysia, Philippines, Thailand, Cambodia, Vietnam and India<sup>(4)</sup>.

The various phytochemicals found in the betel plants are chavibetol, chavicol, hydroxychavicol, estragole, eugenol, methyl eugenol, hydroxycatechol, caryophyllene, eugenol methyl ether, cadinene,  $\gamma$ -lactone, allylcatechol, p-cymene, cepharadione A, dotriacontanoic acid, tritriacontane, p-cymene, terpinene, eucalyptol, carvacrol,

sesquiterpenes, cadinene, caryophyllene, dotriacontanoic acid, hentriacontane, pentatriacontane, stearic acid, n-triacontanol<sup>(5)</sup>.

## MATERIALS AND METHODS

### *PIPER BETLE (BETEL LEAF)*

**Botanical Name:** *Piper siriboa* L.

**Kingdom:** Plantae

**Family:** Piperaceae

**Part typically used:** Leave

**Color:** Green

**Chemical Constituents:** Chavibetol, Caryophyllene, Chavibetol acetate, Allylpyrocatechol Diacetate, Chavibetolmethylether, Campene, f-Pinene, Eugenol, u-Limonene, a-Pinene, 1,8-Cineol, Saprobe, Allylpyrocatechol Monoacetate<sup>(6)</sup>.

**Uses:** Stimulant, Antiseptic, Antifungal, to treat dry skin and wrinkles.

### ALOVERA

**Botanical Name:** *Aloe barbadensis* miller

**Biological Name:** Alovera

**Kingdom:** Plantae

**Family:** Asphodelaceae (Liliaceae)

**Common Name:** Gwar, Pathaor Ghrit Kumari, *Aloe barbardensis* Miller

**Part typically used:** Leaves

**Color:** Green

**Chemical Constituents:** Minerals, Sugars, Vitamins A C E, Lignin, Saponin enzyme, Salicylic acid



**Uses:** Psoriasis Seborrhea Dandruff, Minorburns, Skin abrasions, Skin injured by radiation, Herpessores, Acne

SHIKAKAI

**Botanical Name:** *Acacia concinna*

**Kingdom:** Plantae

**Family:** Leguminosae

**Part typically used:** Fruits

**Color:** Brown

**Chemical Constituents:** Lupeol, Spinasterol, Acacia acid, Lactone

**Uses:** Prevents dryness, Control hair fall, Treats dandruff and reduces white flakes.



## METHODOLOGY

### Selection of Plant

In the present study, we have selected the plant *Piper betle* (Betel Leaf).

### Collection of Plant Material

The Piper betle (Betel Leaf) leaves are collected from the market of Nandurbar City.

### Extraction of Betel leaf oil

Ingredients	Batch F1	Batch	
		F2	F3
Palm Oil	11	22	00
Coconut Oil	11	00	22
Sodium Hydroxide	7	6	5
Stearic Acid	6.5	6.5	6.5
Glycerine	17	17	17
Propylene Glycol	31	31	31
Sorbitol	31	31	31
Water	11	11	11

The leaves are triturated using a mortar and pestle and grinded then squeezed it using a cotton cloth.

### Preparation of Basic Glycerine Soap

The lye solution was made by combining sodium hydroxide and distilled water in a 1000ml glass beaker, heating it on a heating mantle to below 500<sup>0</sup>C until it turned transparent, and then cooling it. Lye solution, which was created by heating up coconut oil and stearic acid, was added. Pour the glycerine and propylene glycol into it. Add the previously made sorbitol solution when the sugar has completely dissolved in the water.

For around 30 minutes, boil the soap while it is covered and sealed. Put the Beaker's cover on it and simmer the soap mixture for a long time (around Hours) until it turns translucent. I followed that by carefully pouring glycerine soap into the soap moulds. The mixture was allowed to cool to and solidify in soap moulds in the refrigerator.

### Procedure of Polyherbal Soap formulation

- The small pieces of the prepared basic glycerin soap put into the beaker and melted on a Heating Mantle at temperature below 60<sup>0</sup>C.
- Betel leaf, Black cumin extract were added after that all of the components such as Honey, Aloe vera, Ethanol, Stearic acid were combined together.

➤ The liquid was poured into the mould, which was then allowed to harden at room temperature and evaluated the various parameters of soap<sup>(7)</sup>.

Ingredients	Quantity	Uses
Soap Base	75gm	
Betel leaf Extract	5.6ml	Antifungal
Blackcumin Extract	0.5gm	Anti-viral
Alovera Gel	2gm	Anti-aging
Stearic Acid	1gm	Hardening
Honey	1gm	Antibacterial
Lavender Oil	5to7drops	Perfume
Shikekai	1gm	Cleanser
Ethanol	5ml	Solvent

## EVALUATION OF POLYHERBAL SOAP FORMULATION

### Organoleptic Evaluation

Organoleptic evaluation such as colour and clarity was done by sensory and visual inspection.

### Determination of pH



The pH of prepared herbal soap was determined by using a digital pH meter<sup>(8)</sup>.

### Determination of Percentage Free Alkali

For the determination of the percentage free alkali in the conical flask 5gm of dissolved prepared polyherbal soap in 50 ml of neutralized alcohol was boiled under the reflux on a water bath for 30 minutes. Then it was cooled and added 1 ml of Phenolphthalein solution as an indicator. After that the solution was titrated with 0.1 ml of HCL solution <sup>(9)</sup>.

### Foam Height

5g of soap was weighed into a 100ml glass beaker. 10ml of distilled water was added to it, marsh and allowed to stand for 30 minutes (this allows the soap to disperse in the water). The contents of the beaker were stirred and the slurry was transferred to a 250ml graduated measuring cylinder. The residue in the beaker was rinsed and transferred with further 5 -6ml portion of water to the cylinder. The contents of the cylinder were stirred to ensure a uniform suspension. The cylinder was stoppered and subjected to 12 complete shakes. The cylinder was allowed to stand for 5 minutes and the volume of foam calculated as <sup>(9)</sup>.

Foaming ability = L1 - L2

L1= Volume in ml of foam with water

L2= Volume in ml of water only

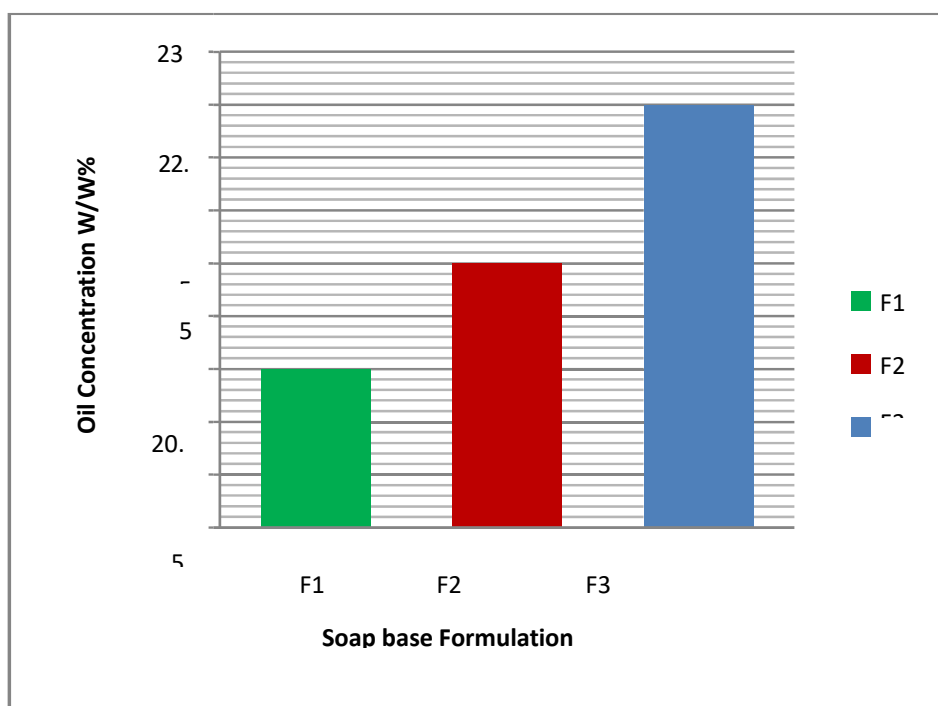


### Foam Retention

To determine the foaming propensity, a 1 g portion of each soap formulation was dissolved in 10 ml of water (distilled and tap water) by minimum heat ( $\leq 60^{\circ}\text{C}$ ) and 5ml of the resultant solution was transferred into a 10-ml test tube. The test tube was shaken for 1 min and then left to stand undisturbed. The time taken for the soap solution to defoam, in triplicate tests, was recorded <sup>(13)</sup>.

### Emolliency test

Emolliency test evaluates occlusiveness of soap formulations. A 2 g portion of each soap formulation was smeared onto the surface of white sheets of paper over approximately 5 cm<sup>2</sup> surface area and left to stand on the laboratory shelf for 24 h after which the degree of translucency was graded into a three- level ranking: mild, moderate, or strong translucency <sup>(10)</sup>.



### Alcohol Insoluble Matter

5 gm of soap was taken in a conical flask and 50 ml of ethanol added and shaken vigorously to dissolve. The solution was filtered through a filter paper with 20 ml warm ethanol and dried at 105°C for 1 hour. The weight of dried paper was taken <sup>(11)</sup>.

$$\% \text{ alcohol insoluble matter} = \text{Weight of residue} / \text{Weight of Soap} \times 100$$

### Colour

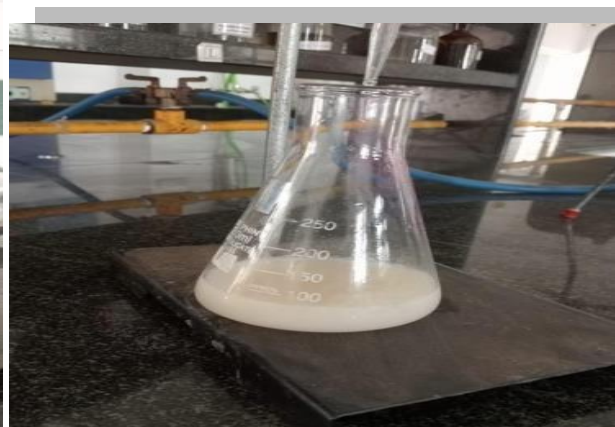
Colour determination was done by visual inspection against a white background.

### Estimation of saponification value

Saponification value gives an idea on the amount of NaOH (lye) needed to make soap. 1g of oil was weighed and transferred into a round bottom flask. 20 ml of 0.50 N alcoholic caustic potash was added to it. Sample without oil was also set for blank titration. Both were refluxed in round bottomed flasks for 1 hour. After refluxing, both the round bottomed flasks were allowed to cool. Both samples were titrated using 0.50N HCl with phenolphthalein indicator. Disappearance of pink color was noted as indicative of the end point. These values were noted to determine the saponification value using the formula<sup>(12)</sup>:



Saponification Value = (Titre value of blank in ml – Titre value of sample in ml) x Normality of KOH x equivalent weight of KOH / 1g Oil



### ***Betel Leaf Polyherbal Soap***

SR. NO	PHYSICOCHEMICAL PARAMETERS	HERBAL SOAP RESULT
1	Appearance	<b>Brown</b>
2	Odor	<b>Pleasant smell</b>
3	Texture	<b>Solid and Smooth</b>
4	Foam height (cm)	<b>8cm</b>
5	Foam retention	<b>60min</b>
6	Alcohol Insoluble Matter	<b>1.2%</b>
7	Ph	<b>9.3</b>
8	Saponification value	<b>164.9g/ml</b>

## RESULT

The making and testing of polyherbal soap were done. The physiochemical properties of the produced soap were determined. The formulation's Ph value was within the desired range of 9.31 and it had pleasing aesthetic features. Other elements were discovered, including alcohol-insoluble materials, foam height, and foam retention. Tabulated are the outcomes of the various parameters. According to the statistics, the herbal formulation's pH was between 9 and 10, which was perfect for application to the skin. Skin pH values that are higher or lower may indicate negative impacts on the skin. The foam retention time of the prescribed herbal formulation was 60 minutes, and its foam height was 8 cm. This indicates that the soap's ability to produce lather and that it was dependable and good. 66% of everything there was fat discovered. A manufactured soap's overall fatty matter content is a reliable measure of its quality. If the total amount of fatty content is decreased, it is not optimal for dry skin. The skin's capacity to retain moisture is aided by the presence of more fatty tissue. The saponification value was found to be 164.9g/ml.

## CONCLUSION





The polyherbal soap was produced using the cold process method. The created formulation demonstrates advantageous physical characteristics. The formulation delivers good foaming qualities based on its evaluation criteria. The prepared polyherbal soap composition gave positive results when evaluated for various tests. It has been demonstrated that using these soaps does not in any way irritate skin; as a result, soap is not proven to irritate skin in any manner.

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## REFERENCES

1. Shah, Rutuja R; Patil, Poonam J; Adnaik, Pratibha R; Adnaik, Rahul S, "Biochemical profiling of Antifungal soap activity of betel leaf (*Piper betle* L.) Extract and Garlic oil by *In vitro* method", Asian Journal of Pharmaceutical Research; Raipur Vol. 10, Iss. 4, (Dec2020).
2. Basireddy Sivareddy, Bernard Ajay Reginald, D Sireesha , Meda Samatha, K Himakar Reddy, and G Subrahmanyam, "Antifungal activity of solvents extracts of *Piper betle* and *Ocimum sanctum* Linn on *Candida albicans*: An *in vitro* comparative study" J Oral Maxillofac Pathol, 2019 Sep-Dec; 23(3):333-337.
3. Chopra's Indigenous Drugs of India Academic Publisher 1946, 47-52.
4. V. R. Balasubrahmanyam and A. K. S. Rawat Betelvine (*Piper betel*, Piperaceae) Economic Botany Vol. 44, No 4 (Oct-Dec, 1990), 540-543.
5. Rao A R, Sinha A, Selvan R S. Inhibitory action of Piper betle on the initiation of 7.12 -dimethylbenz anthracene-induced mammary carcinogenesis in rats. Cancer Lett 1985; 26:207-14.
6. Ni Made Dwi Mara Widayani Nayaka, Maria Malida Vernandes Sasadara, Dwi Arymbhi Sanjaya, Putu Era Sandhi Kusuma Yuda, Ni Luh Kade Arman Anita Dewi, Erna Cahyaningsih and Rika Hartati, "*Piper betle* (L): Recent Review of Antibacterial and Antifungal Properties, Safety Profiles, and Commercial Applications", Molecules. 2021 Apr; 26(8):2321.
7. Selvamani M., Surya Prakash R., Siva Shankar D., Subash K., Siva Guru M., L. V. Vigneswaran, M. Senthil Kumar, wjpmr, 2022, 8(2), 170–173.
8. Zeeshan Afsar & Salma Khanam. Int. Res. J. Pharm. 2016, 7(8), ISSN 2230-8407.
9. Inamdar Sanobar M, Mrs Shelke Dipali S, Bhasale Sakshi S, Bhalerao Pooja A, "Formulation and Evaluation of Antibacterial Poly Herbal Soap", International Journal of Advanced Research in Science, Communication and Technology, Volume 2, Issue 1, July 2022.
10. Ayobami O. Oyedele, Ezekiel O. Akinkunmi, Doyinsola D. Fabiyi and Lara O. Orafidiya., "Physicochemical properties and antimicrobial activities of soap formulations containing *Senna alata* and *Eugenia uniflora* leaf preparations", Journal of Medicinal Plants Research, Vol. 11(48), pp. 778-787, 25 December, 2017.
11. Abubakar El-Ishaq And Anih Chioma Anthonia, "Qualitative Analysis of Some Soap", Academic Publications and Research Association of Nigeria (APRAN) Volume No. 61 September, 2012 Page no.73-84.
12. Low, Lai Kim; Ng, Cher Siang, "Determination of Saponification Value", Marine Fisheries Research Department, Southeast Asian Fisheries Development Center.
13. Abubakar El-Ishaq and Anih Chioma Anthonia, "Qualitative Analysis of Some Soap", Academic Publications and Research Association of Nigeria (APRAN) Volume 6. No. 1 September, 2012 Page no.73-84.
14. Arti P. Pawar, Dhanashri N. Pawar, Yogita V. Dalvi, "Formulation and Evaluation of Polyherbal Soap", Research J. Topical and Cosmetic Sci. 10(1): January–June 2019.
15. R. Margret Chandira, Lokeshwaran S and S. Gracy Gladin, "Formulation and Evaluation of Herbal Soap by using Melt and Pour Method", Indian Journal of Natural Sciences, Vol.13, Issue 72, June, 2022, ISSN:0976–0997.

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