

Herbal Antifungal Soap

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Abstract: *The Indian culture is blessed with the gift of Ayurveda from our ancestors. The Indian culture is full of traditional herbal medicines which are used in daily life of each and every Indian, the Ayurveda system of medicine has cure about every disease condition. This knowledge is passed from one generation to next generation.*

Antifungal soap is a type of soap which is used to get rid from various fungal infections these are may be medicated with allopathic drugs such as luliconazole or may include the traditional herbal medicines such as herbal oils or plant extracts. As compared to the modern medicine techniques the herbal soap formulations has lesser side effects and has wider activity of action. Hence they are getting more popular in peoples nowadays.

The proposed preparation is based on the formulation of soap using herbal medicinal oils and plant extract like neem aloe Vera and garlic.

The formulation contains neem oil to treat fungal infections. The neem is a well known herbal medicinal plant and it is quiet reputed in Ayurveda because of its wide range of medicinal properties it has Anti-diabetic effect. Antioxidant, effect. Anticancer effect. Antiviral activity, Antibacterial activity. Antimalarial activity, Antiulcer effect. Hypoglycemic activity. Immunostimulent activity etc. The next ingredient is aloe Vera, people have recognized and used the aloe Vera plant for its benefits to their health, appearance, and skin. The Arabic word "Alloeh," which means "shining bitter substance," is the source of the name Aloe Vera, while the Latin word "Vera" signifies "true." Scientists believed that aloe Vera was a universal cure-all 2000 years ago. Aloe was known to the Egyptians as "the plant of immortality." The aloe Vera plant is utilized in dermatology nowadays for a variety of treatments. The aloe Vera has various medicinal activities such as Antifungal activity:

Aloe barbadensis miller or Aloe Vera has been used for therapeutic purposes since ancient times with antifungal activity known to be amongst its medicinal properties. Aloe Vera shows strong antifungal activity against selective fungal pathogens the study also revealed that the alcoholic extract aloe Vera can give better results as compared to other.

Healing properties Effects on the immune system, Anti-inflammatory action, Laxative effects, Antiviral and antitumor activity, Moisturizing and anti-aging effect, Antiseptic effect etc. the another ingredient is garlic oil Allium sativum is a perennial member of the Amaryllidaceae family that is planted for its flavorful bulbs. Although it is native to central Asia, the plant grows wild in southern France and Italy and is a traditional component in many different national cuisines. The bulbs are often not consumed raw because of their strong onion-like fragrance and flavor, Antifungal activity Antibiotic activity, Treatment of wart virus, Cardiovascular Disease, Cancer treatment, Lipid Lowering Effect, Anti-Inflammatory Properties, Antioxidant Capacity.

Keywords: antifungal, herbal soap, antiseptic, neem, aloe vera, garlic oil

I. INTRODUCTION

Antifungal soaps are the topical preparation's used to supportive treatment on various fungal infections like eczema, psoriasis, athlete's foot, many more fungal infections. The herbal soap preparations are quiet popular in treatment of fungal infections because of its natural ingredients with minimal side effects and wide spectra of activity. Theses preparations are nowadays getting more popular. The fungal infections are more common in peoples nowadays, with the help of proposed formulation peoples can get rid of fungal infections and the in comfort caused by it.

The advantage of antifungal soap is to treat the infection with minimal side effects and also with cost effective way.

Neem



Neem (*Azadirachta indica*), also known as Nim Or Margosa, is a fast-growing tree of the mahogany family (Meliaceae) that is prized for its timber, medical properties, and use as a source of natural insecticides. Neem is most likely indigenous to South Asia's drier regions, including the Indian subcontinent. It has been brought to several nations in South and Central America, the Caribbean, and areas of Africa. The plant has a long history of usage in Ayurvedic and traditional medicine, cosmetics, and organic farming. (1)

Plant Specifications

Neem trees have appealing rounded crowns, thick furrowed bark, and a height range of 15 to 30 meters (49 to 98 ft.). The complex leaves are normally evergreen and feature serrated leaflets, although they can drop off during extremely dry spells. The male or staminate (bisexual) little, fragrant white blooms are borne in bunches in the axils of the leaves. The fruit's flesh has a pleasant flavor and is a smooth yellow-green drupe. Although cuttings or root suckers can be used to multiply neem, seeds are often the preferred method. The plant thrives in rocky, poor soil because it is tough and tenacious. Neem can withstand a broad range of climatic conditions, although it cannot endure waterlogging or subfreezing temperatures.(1)

Azadirachta Indica

Synonyme : margosa, neem, nimtree or Indian lilac

Family : Meliaceae.

Kingdom: Plantae

Phylum: Magnoliophyta

Class: Magnoliopsida

Subclass: Rosidae

Order: Sapindales

Family: Meliaceae

Genus: *Azadirachta*

Subject: *Azadirachta indica*

Although it was originally from the northeast of the Indian subcontinent and Indochina, it has now become naturalized and is now cultivated in tropical and subtropical regions all over the world. Neem oil is produced from the plant's fruits and seeds. Neem is a Hindustani noun that is derived from the Sanskrit word nimba.

Chemical constituents:

Neem, *Azadirachta indica* L., has a therapeutic role in the management of health since it is a rich source of many different kinds of substances. Azadirachtin is the most significant active component, followed by sodium nimbin, nimbolin, nimbin, nimbidin, nimbidol, gedunin, salannin, and quercetin. The compounds nimbin, nimbanene, 6-desacetylnimbinene, nimbandiol, nimbolide, ascorbic acid, n-hexacosanol, 7-desacetyl-7-benzoylazadiradione, 17-hydroxyazadiradione, and nimbiol are all found in leaves. Neem fresh leaves were used to extract the polyphenolic flavonoids quercetin and β -sitosterol, which are known to have antibacterial and antifungal activities. Neem seeds also contain important compounds including gedunin and azadirachtin.(2)

Medicinal Uses:

Antifungal activity:

A fungal affliction Since time immemorial, people have thought that Neem is effective against certain fungi that infect the human body. Neem preparations have been discovered to be effective against a number of significant fungi, including athlete's foot fungus, which affects the skin, hair, and nails, ringworm, which attacks the skin and nails of the feet, fungi that grow in the lungs, bronchi, and mucous membranes, and fungi that are normally found in the mucous membranes but can become out of control and cause lesions in the mouth (thrush), vagina, etc. Neem leaf and oil seed extracts are effective against a number of fungus, including *Candida*, *Trichophyton*, *Epidermophyton*, *Microspor*, *Trichosporon*, and others.(3)

Effect on central nervous system.

Anti-diabetic effect.

Anti-oxidant effect.

Anticancer effect.

Antiviral activity.

Antibacterial activity.

Antimalarial activity.

Antiulcer effect.

Hypoglycemic activity.

Immunostimulant activity.

Marker Compound For Antifungal Activity Of Neem

The scientists used HPLC to separate the active fractions of neem organic extracts and discovered that they included significant amounts of active ingredients such as 6-deacetylnimbin, azadiradione, nimbin, salannin, and epoxyazadiradione when they were bio assayed on numerous pathogenic fungi.(4)

Garlic



Allium sativum is a perennial member of the Amaryllidaceae family that is planted for its flavorful bulbs. Although it is native to central Asia, the plant grows wild in southern France and Italy and is a traditional component in many different national cuisines. The bulbs are often not consumed raw because of their strong onion-like fragrance and flavor.

The average height of a garlic plant is 60 cm (2 ft.). Depending on the cultivar, the long leaves often emerge from a soft pseudo stem made up of overlapping leaf sheaths or from a short, firm stem above the bulb. The clove-shaped bulb has a membrane skin covering and contains up to 20 edible bulblets. When the green-white or pinkish flowers bloom, the bracts that were earlier covering the spherical flower cluster split open. Sometimes small bulbils (secondary bulbs that grow in lieu of blooms) and sterile blossoms appear on flower stems. Cloves or top bulbils are often planted to propagate garlic; however seeds may also be used. Garlic is typically produced as an annual crop (5).

In ancient and mediaeval times, garlic was prized for its healing properties and employed as a charm against vampires and other evils. There is some proof that the plant, which is used in traditional and folk medicine in many cultures, may help with heart disease prevention. The major components of essential oil, which makes up around 0.1 percent of garlic, are diallyl disulfide, diallyl trisulfide, and allyl propyl disulfide.(5)

Plant Specifications:

A perennial blooming plant, *Allium sativum* grows from a bulb. It has a one meter (three feet) tall, upright blooming stem. The leaf blade has a sharp apex, is flat, linear, and solid, and is 1.25–2.5 cm (0.5–1.0 in) in width. In the Northern Hemisphere, the plant can produce pink to purple blooms from July through September. The odoriferous bulb has an inner sheath that encloses the clove and outer layers of thin sheathing leaves. Frequently, the bulb includes 10 to 20 asymmetrically shaped cloves, with the exception of those closest to the center. Garlic may grow as far north as Alaska if it is planted at the right time and depth. As far north as Alaska, it is cultivable. Hermaphrodite blooms are produced by it. Bees, butterflies, moths, and other insects pollinate it.

Garlic (*Allium sativum*) :

Synonym: Garlic

Family: Amaryllidaceae.

Kingdom: Plantae

Phylum: Tracheophyta

Class: Lilopsia

Order: Asparagales

Family: Meliaceae

Genus : *Allium*

Subject: *Allium Sativum*

Chemical Constituents :

A. sativum bulbs are said to contain hundreds of phytochemicals, including ones that include sulphur. such as ajoenes (E-ajoene, Z-ajoene), thiosulfinates (allicin), vinyl dithiins (2-vinyl-(4H) -1,3-dithiin, 3-vinyl-(4H)-1,2-dithiin), sulphides (diallyl disulfide (DADS), diallyl trisulfide (DATS)) and others that comprised 82% of the overall garlic sulphur content [30]. After severing the garlic and dissolving the parenchyma, the enzyme allinase converts alliin, the primary cysteine sulfoxide, to allicin. The primary aroma compounds in freshly milled garlic homogenates are S-propyl-cysteine-sulfoxide (PCSO), allicin, and S-methyl cysteine-sulfoxide (MCSO). Allinase enzyme can operate on the mixture of MCSO, PCSO, and alliin to form additional compounds, such as allyl methane thiosulfinates, methyl methanethiosulfonate, and other molecules. PCSO can produce more than fifty metabolites depending on water content and temperature. Additionally, analogous thiosulfinates (R-S-S-R'), where R and R' are allyl, propyl, and methyl groups(6,11)

Medicinal Uses:

Antifungal activity:

For thousands of years, traditional medicine has employed garlic, a popular food, extensively. It has been demonstrated that garlic oil, which is made from garlic, has potent antifungal and anti-inflammatory properties. The most prevalent volatile sulfur-containing molecules in garlic oil are diallyl trisulfide (DTS) and diallyl disulfide (DDS). Garlic oil demonstrated strong antifungal action against *C. albicans*, according to trials.(7,8,9,10,11)

Antibiotic activity.

Treatment of wart virus .

Cardiovascular Disease.

Cancer treatment.

Lipid Lowering Effect.

Anti-Inflammatory Properties.

Antioxidant Capacity. (7, 8, 9, 11)

Marker compound for antifungal activity of *Allium sativum*:

Since 3,000 BC, garlic (*Allium sativum* L.) has been planted all over the world as a vegetable and a condiment. The majority of garlic's biological properties, such as its bactericidal, antifungal, and antiviral effects, are attributable to its primary ingredient, **Allicin**. However, other components of garlic have anti-inflammatory, hypocholesterolemic, vasodilator, antioxidant, and immunomodulatory properties.(11)

Aloe Vera



For millennia, people have recognised and used the aloe Vera plant for its benefits to their health, appearance, and skin. The Arabic word "Alloeh," which means "shining bitter substance," is the source of the name Aloe Vera, while the Latin word "Vera" signifies "true." scientists believed that aloe Vera was a universal cure-all 2000 years ago. Aloe was known to the Egyptians as "the plant of immortality." The aloe Vera plant is utilised in dermatology nowadays for a variety of treatments.

Greece, Egypt, India, Mexico, Japan, and China are just a few of the cultures that have employed aloe Vera for therapeutic purposes for millennia.1 The Egyptian princesses Cleopatra and Nefertiti utilised it as a regular component of their beauty regimens. It was used to cure soldiers' wounds by Alexander the Great and Christopher Columbus. John Goodyew's translation of Dioscorides' medical book *De Materia Medica* in A.D. 1655 had the earliest mention of aloe Vera in written English.2 Aloe Vera was already being used in America as a laxative by the early 1800s, but in the middle of the 1930s, something changed when it was effectively utilised to treat chronic and severe radiation dermatitis.(12,13,14)

Plant Specifications:

Aloe Vera

Synonym: Chinese Aloe, Cape Aloe or Barbados Aloe.

Family: Asaphodelaceae.

Kingdom: Plantae.

Order: Asparagales.

Genus: Aloe.

Subject: Aloe Vera.

Chemical Constituents:

About 75 potentially active ingredients, including vitamins, enzymes, minerals, sugars, lignin, saponins, salicylic acids, and amino acids, are found in aloe Vera.

Both the core parenchyma tissue of A. Vera leaves and the exudate originating from the cells close to the vascular bundles have yielded a large number of chemicals with various architectures. The 1,8-dihydroxyanthraquinone derivatives and their glycosides, which are mostly employed for their cathartic effects, are present in the bitter yellow exudate. In addition to the various carbohydrates, it has been demonstrated that the aloe parenchyma tissue or pulp contains proteins, lipids, amino acids, vitamins, enzymes, inorganic chemicals, and tiny organic molecules. There is some proof of chemotaxonomic diversity in the polysaccharide makeup of aloes. (12, 13, 14)

Medicinal Uses:

Antifungal activity:

Aloe barbadensis miller or Aloe Vera has been used for therapeutic purposes since ancient times with antifungal activity known to be amongst its medicinal properties. Aloe Vera shows strong antifungal activity against selective fungal pathogens the study also revealed that the alcoholic extract aloe Vera can give better results as compared to other. (12, 13, 14, 15)

Healing properties

Effects on skin exposure to UV and gamma radiation

Effects on the immune system

Anti-inflammatory action

Laxative effects

Antiviral and antitumor activity

Moisturizing and anti-aging effect

Antiseptic effect

Marker compound for antifungal activity of Aloe Vera

Aloe-emodin (1,8-dihydroxy-3-(hydroxymethyl)anthracene- 9,10-dione) derived from leaves of Aloe Vera is an antimicrobial and antifungal compound.(14,15).

Formulation



API (Active Pharmaceutical Ingredients):

this formulation mainly contains three active herbal ingredients aloe vera, neem and garlic the pharma grade marketed preparation of these ingredients are used for this formulation

Excipients

Coconut oil :

the coconut oil is widely used in the formulation of soap base also it has antifungal activity and ease of availability .

SodiumHydroxide :

it is used for saponification process of soap base .

Glycerin :

the glycerin is added in the formulation to soothen and moisturize the skin also it can helps to prevent the scaling of the skin caused by fungal infection by moisturizing effect.

Preservatives :

the preservatives are added to the product to prevent microbial growth in the formulation.

Water: distilled water is used for formulation as vehicle and solvent for NaOH.

Perfume: orange oil is used as flavouring agent to mask the unpleasant odour of garlic, neem and aloe Vera.

FORMULATION TABLE

The formulation is set by studying the chemical compatabilty of the ingredients .three formula tables are prepared by varying the quantity of ingredients to check to efficacy of the formulation and also to conclude the better one

FORMULATION TABLE– 01

Sr.No.	Ingredients	quantity taken (per100gm)	Use
01.	aloe Vera extract	5ml	Antifungal agent(API)
02.	neem oil	5ml	Antifungal agent(API)
03.	garlic oil	1ml	Antifungal agent(API)
04	sodium hydroxide	10gm	soap base
05.	coconut oil	50ml	soap base
06.	glycerin	5ml	soap base
07.	water	50ml	moisturizer
08.	perfume	Q.S.	flavouring agent
09.	preservative	0.1gm.	preservative

FORMULATION TABLE – 02

Sr.No.	Ingredients	quantity taken (per100gm)	Use
01.	neem oil	5ml.	Antifungal agent(API)
02.	garlic oil	1ml.	Antifungal agent(API)
03	sodium hydroxide	10gm.	soap base
04.	coconut oil	50ml.	soap base
05.	glycerin	0ml.	soap base
06.	water	50ml.	moisturizer
07.	perfume	Q.S.	flavouring agent
08.	preservative	0.1gm.	preservative

FORMULATION TABLE - 03

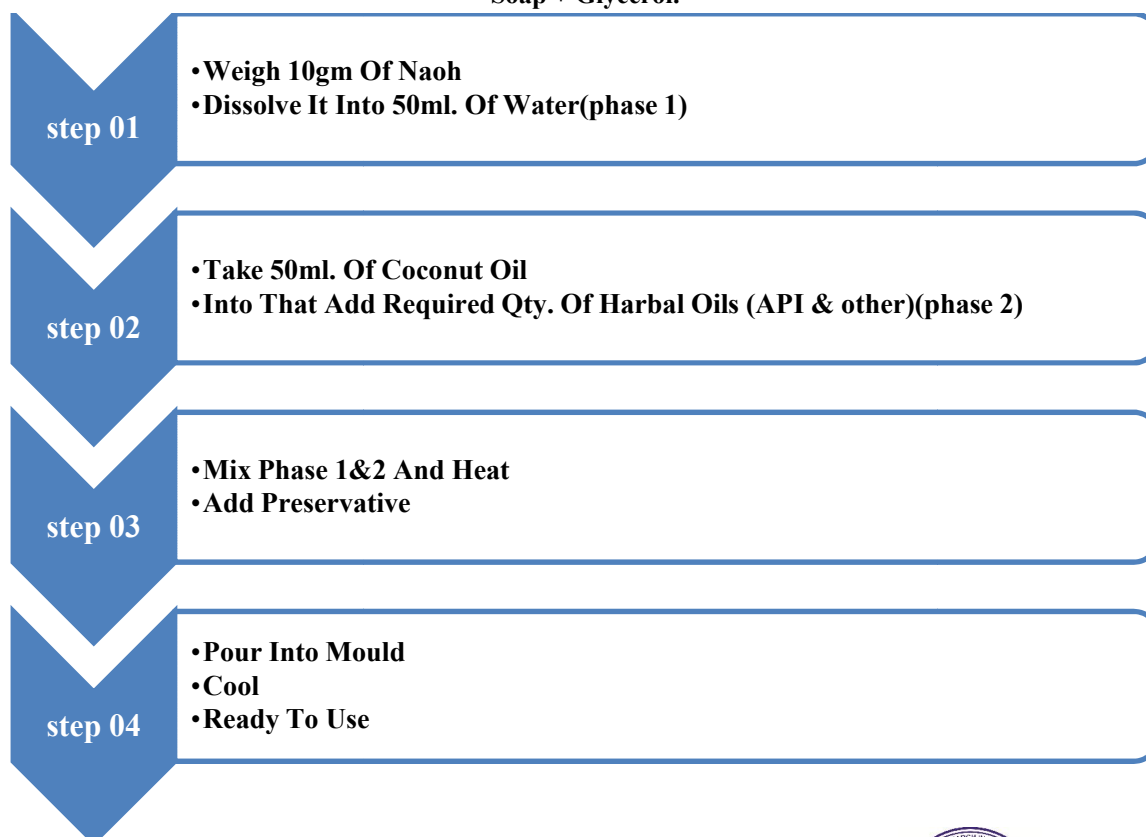
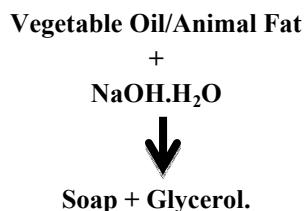
Sr.No.	Ingredients	quantity taken (per100gm)	Use
01.	aloe Vera extract	5ml.	Antifungal agent(API)
02.	neem oil	5ml.	Antifungal agent(API)
03.	sodium hydroxide	10gm.	soap base
04.	coconut oil	50ml.	soap base
05.	glycerin	5ml.	soap base
06.	water	50ml.	moisturizer
07.	perfume	Q.S.	flavouring agent
08.	preservative	0.1gm.	preservative

II. METHOD USED FOR FORMULATION.

Hot process for saponification.

The method of making soap by alkaline hydrolysis of a fat or oil, also known as saponification, involves heating an ester with an alkali. It is the mechanism by which sodium hydroxide (lye) breaks down a fat molecule into four smaller molecules: three soap molecules and one glycerol molecule. [Water was typically poured through wood ash to create lye]. Sodium chloride is added to this process to aid in precipitating the soap. It does this through salting out, a process where the ion action reduces the soap's solubility. (16)

The following equation describes how soap is created.



Evaluation of Soap.

Evaluation Parameters.

Physicochemical Parameters.

Odor

Appearance

Size

Shape

Color

PH : At 25°C room temperature, the pH of a 10% formulated product solution in distilled water was measured.(17,18)

Calculating the percentage of solids content: A little piece of specially made herbal soap was placed to the evaporating dish along with a weighted clean, dry evaporating dish. Weighing was done on both the dish and the finished product. Only after calculating the precise weight of the prepared medicinal herbal soap, was the evaporating dish filled with the prepared goods set on the hot plate until the liquid portion was evaporated. After drying, the weight of the formed product's solids solely was determined.(17,19)

Foam stability and foaming capacity: The ability to produce foam was evaluated using the cylinder shaking method. A 250 ml graduated cylinder was filled with 50 ml of the 1% prepared soap solution, covered with one hand, and shaken ten times. The entire volume of the foam content was measured after 1 minute of shaking. By measuring the foam volume after a 1 and 4-minute shake test, foam stability was evaluated.(17,18,19)

Test For Skin Irritancy

Alcohol Insoluble Matter:5 grammes of produced soap were dissolved in warm ethanol as an alcohol-insoluble substance. Then utilize a tarred filter paper to filter the solution. Filter paper was then dried at 105°C. The weight of the dried paper was then determined, and the percentage of alcohol-insoluble stuff was computed. (17,19)

Percentage of alcohol insoluble matter = weight of residue × 100 / weight of the sample.

Microbiological Study: Staphylococcus aureus and pseudomonas aeruginosa were swabbed equally throughout a culture plate to test the efficacy of an antibiotic agent against fungi and bacteria produced in culture. Then soap solution was applied to the agar surface. Following that, the plates were kept in the incubator for 24 hours at 30⁰C. and zone inhibition were observed .(17,19)

III. RESULT DISCUSSION

Physicochemical Tests.

Sr.No	Test	Formulation1	Formulation2	Formulation3	Observation	Results
01.	Odor	Fragrant	Fragrant	Fragrant	Fragrant odor	Complies
02.	Appearance	Solid bar	Solid bar	Solid bar	Complies	Complies
03.	Shape	Square in shape	Square in shape	Square in shape	Complies	Complies
04.	Color	Greenish brown	Dark green	Light brown to yellow	Complies	Complies
05.	PH	7.9	7.4	8.0	Neutral PH Observed	Complies
06.	% solid content	26%	27.14%	27.81%	Complies	Complies
07.	Foaming capacity	11 cm	11 cm	11 cm	Complies	Complies
08.	Foaming stability	4 min 40sec	4 min 55sec	4 min 52sec	Complies	Complies

09.	Skin Irritancy Test	No irritation	No irritation	No irritation	Complies	Complies
10.	Alcohol insoluble matter	23.12%	21.02%	21.63%	Complies	Complies

Antimicrobial Evaluation.

Sr. No.	Organism	Control sample	Formulation 1 (1% concentration)	Formulation 2 (1% concentration)	Formulation 3 (1% concentration)
01.	Control sample	No Inhibition	Inhibition of growth observed	Inhibition of growth observed	Inhibition of growth observed
02.	Staphylococcus Aureus	No Inhibition	Inhibition of growth observed	Inhibition of growth observed	Inhibition of growth observed
03.	Pseudomonas Aeruginosa	No Inhibition	Inhibition of growth observed	Inhibition of growth observed	Inhibition of growth observed

IV. RESULT

The formulated soap preparations are complies to all parameters setted for Evaluation. all preparations have antifungal and antimicrobial property but the formulation 01 has the better activity and skin compatibility as compared to formulation 02 and 03 but the formulation 01 has bit of characteristic smell of garlic oil because of its high purity but it can be further managed by changing the flavoring agent or to increasing the conc. of flavoring agent. Also all three formulations have excellent activity and fragrance.

V. CONCLUSION

The formulation and evaluation antifungal soaps form herbal origin are prepared and hence we can conclude that the antifungal and antibacterial activity of neem aloe Vera and garlic can be used in the formulation of soap to treat various skin conditions also this formulation can used in daily life for normal skin.

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