

Design, Development and evaluation of polyherbal soap against bacterial skin infections

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ABSTRACT:

Bacterial infections are more common and use of herbs on skin disorders has been for thousand years. Numerous chemical toxins, micro-organisms present in the atmosphere may cause chemical infection and damage to skin. Neem (*Azadiractha Indica*) tree, *Murraya koneigii* and Aloevera have attracted worldwide owing to its wide range of medicinal properties. The selected plants and its constituents have been demonstrated to exhibit anti-inflammatory, antihyperglycemic, antiulcer, antimalarial, antifungal, antibacterial, and antimutagenic and anticarcinogenic properties. The Polyherbal soap using neem, aloevera and murraya koneigii find effective antimicrobial activity against *S. aureus*, *Candida albicans* and *B. subtilis*.

Keywords: *Polyherbal, Aleovera, Neem, murraya koneigii, Soap etc.*

INTRODUCTION

Soap is a salt fatty acid used in variety of cleansing and lubricating products. In a domestic use soap are usually used for washing, bathing and other types of householding. In industry soaps are used as thickeners, components of some lubricants and precursors to catalyst. When used for cleaning, soap solubilizes particles and grime which can then be separated from the article being cleaned. Soap is created mixing fats and oils with a base as opposed to detergent which is created by combining chemical compound in a mixture. Humans have used soap for cleaning for millennia. Herbal soaps are made of natural plants and ingredients that healthier and beneficial for the skin are less likely to cause any damaging. (1)

Herbal treatments to offer the best treatment solution for the skin infections and 100% natural herbal soaps have found to highly beneficial for the skin. The herbs selected in these soaps have therapeutic action and healing characteristics that offer specific benefits for skin, such as nourishment, strength, healing and moisturizing. These soaps also contain coconut oil which is beneficial to the goodness of skin and overall health. Herbal soaps are also effective in curing different dermal diseases. These soaps also contain glycerin along with coconut oil which is generally not used in commercial soaps. (2) Glycerin helps in retaining the moisture in the skin thereby making these soaps dry for dry skin conditions. The soap is used for cleaning agent has always been associated with man's inherent instinct to keep his body and other belonging clean. Soap helps to remove slag from skin to make skin a brilliant glow. The principal raw material soap is oil and fats. According to these raw materials the quality of soap and category of soap is changed.(3)

Soap is defined as a mixture of chemical compound resulting from the interaction of fatty acid with a metal radical. Soap may also be described as any water-soluble salt of those fatty acid, which contain eight or more carbon atom. The metals commonly used in soap making are sodium and potassium, which produce water. Soluble soap that are used for laundry and cleaning purposes. Herbal soap preparation is a medicine or drugs it contains ant-bacterial and anti-fungal agent which mainly uses of part of plant such as leaves. (4)

Herbs are natural product could be found in the treatment of almost all diseases and skin problem owing to their high medical value, cost effectiveness, availability and compatibility. The attributes of soap include gentleness on the skin, rich lather, protection against various skin disorder, treatment of skin infection (such as ringworm), protection of even skin toning and smoothness of the skin. In comparison to chemical goods, herbal treatment has benefits of being inexpensive, readily available and having less adverse effects. The soap should have good ingredient which have the ability to kill bacteria but not to damage body tissue. Health care worker should use soap according to criteria of health and hygiene. In this way many immunocompromised or low immunity patient can be protected from transfer of pathogenic or opportunistic pathogen. (5)

Aim and Objectives:

- To formulate and evaluate the Polyherbal soap for dermal infections.
- To promote utilization of coconut oil and herbal plant extract as a raw material for soap making.

Materials and Methods:

Herbs Used in formulation of herbal Soaps:

Sr.no	Materials
1	Neem (<i>Azadiracta indica</i>)
2	<i>Murraya Koneigii</i> (<i>Murraya koneigii</i>)
3	Aloevera (<i>Aloe barbadensis miller</i>)



Aloe



Murraya koenigii

The herb used in formulation is Neem, Curry leaves and Aloe vera was selected on the basis of documented literature.

Collection and identification and processing of plant: The leaves of *Azadirachta indica*, *Murraya koenigii*, and *Aloe vera* collected from different matured plant and plant samples authenticated at Dayanand science college Latur.

Extraction: The *Azadirachta indica*, *Murraya koenigii* were extracted with water by maceration process. 100 gm of above stated powder was taken in conical flask and extracted with water for 72 hours with occasional agitation then filtered. *Aloe vera* juice separated from leaf. Formulation of herbal soap 30 gm to obtain extract of *Azadirachta indica*, *Murraya koenigii*, and *Aloe vera* was incorporated into a soap formulated with basic glycerin soap and which contain 100ml ethanol was taken. Glycerin basic soap was melted first and extract was added into melted solution with continuous agitation for 30 minutes until molten mixture became homogeneous. The semisolid mixture was poured into a mould and allowed to solidify. (6)

***Murraya koenigii* (Curry leaves) and Neem Extraction**



Murraya koneigii leaves extract

Neem leaves Extract

EXPERIMENTAL WORK**Preparation of basic glycerin soap:**

Formula of Soap base

Sr.no	Ingredients	Quantity
1	Sodium hydroxide	20gm
2	Coconut oil	50ml
3	Glycerin	10ml
4	Distilled Water	Quantity sufficient

Procedure for Basic Glycerin –

1. Take sodium hydroxide than add water in that and dissolve it than add glycerin stir it and leave for half hour.
2. Take coconut oil heat it and then add sodium hydroxide solution in it. Cook for 5 min.
3. Then add water and add to any container leave it for 1 day.



Fig: Soap Base

FORMULATIONS OF HERBAL SOAP: Herbal Neem Soap (F1):

Neem is a natural herb that comes from neem tree, other names for which include Azadiractha Indica and India lilac. The extract comes from the seeds and of the tree and has properties, but people also use it for hair and dental products.

The medicinal utilities have been described especially for neem. Neem and its constituents have been demonstrated to be exhibit anti-inflammatory, anti-hyperglycemic, antiulcer, anti-malarial, anti-fungal, anti- bacterial, anti-oxidant, anti-mutagenic and anti-carcinogenic properties.

Sr.no	Ingredients	Quantity	Use
1	Soap base	20gm	Soap base
2	Neem extraction	1.5gm	Antibacterial
3	Color	1.5gm	Colorant
4	Sandalwood oil	1.5 ml	Perfume

Herbal Aloe vera Soap:

Aloe vera is commonly known as topical gel used to treat sunburn.

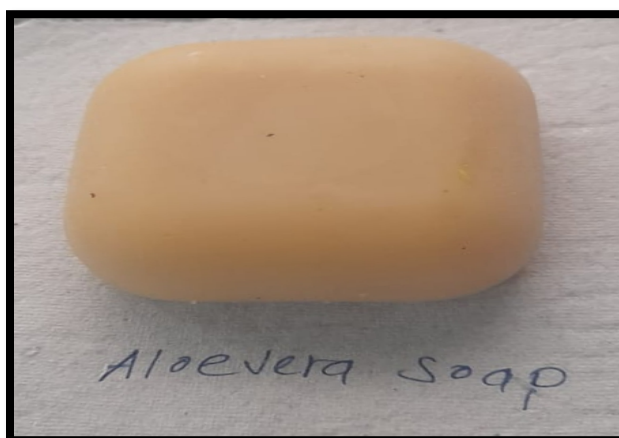
It may also provide other health benefits, largely due to anti-oxidant properties.

Preliminary research has indicated that aloe vera may benefit your skin, dental, oral and digestive health.

It may even improve blood sugar control.

Formulation Table for Preparation of Aloe vera Herbal Soap (F2)

Sr.no	Ingredients	Quantity	Uses
1	Soap base	20gm	Soap base
2	Aloe vera	2ml	Moisturizer
3	Rose water	4ml	Cooling agent
4	Sandlawood oil	1ml	Perfume



Herbal *Murraya Koenigii* (Curry Leaves) (F3):

Murraya Koenigii commonly known as curry leaves is an aromatic shrub upto 6 m in height found in India. In traditional system of medicines, it is used as an antiemetic, antidiarrhoeal, blood purifier flavoring agent in curries and chetneys.

Formulation Table for Preparation of *Murraya Koenigii* (curry leaves) soap (F3):

Sr.no	Ingredients	Quantity	Uses
1	Soap base	20gm	Soap base
2	Curry leaves extraction	1.5gm	Antiseptic
3	Color	1.5gm	Colorant
4	Sandlawood oil	1.5 ml	Perfume



Poly-herbal soap:

Polyherbal soap is a combination of more than one herb in a medicinal preparation. It consists of three herbs Neem, Aloe vera and *Murraya koenigii* (Curry leaves). (7,8)

Formulation Table for Preparation of Polyherbal Soap (F4):

Sr.no	Ingredients	Quantity	Use
1	Neem extract	1.5gm	Antibacterial
2	<i>Murraya Koenigii</i>	1.5gm	Antiseptic
3	Aloe vera	2ml	Moisturizer
4	Soap base	20 gm	Soap base
5	Lemon oil	Quantity sufficient	Perfume



EVALUATION TEST OF SOAP:

1. Organoleptic Evaluation:

Color - Color was checked by naked eyes.

Odor – The smell of formulation was checked by applying preparation on hand and feels the fragrance of perfume.

2. Physical Evaluation:

PH- The pH was determined by using pH paper, the pH was found to be basic in nature.

Foam Retention- 25ml of 1% soap solution was taken into a 100ml graduated measuring cylinder was covered with hand and shaken 10 times. The volume of foam at a 1 minute interval for 4 minute was recorded it was found to be 5 minutes.

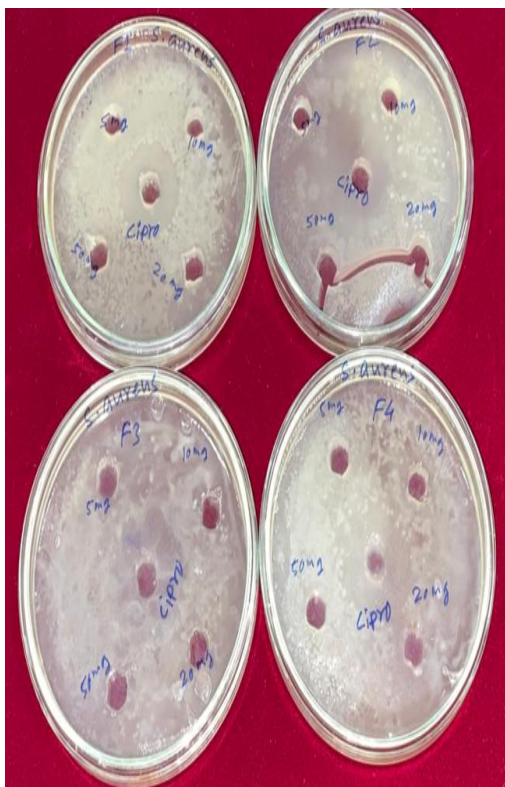
Foam Height- 0.5 gm of sample soap was taken dispersed in 25ml of distilled water. Then, transferred it in to 100ml measuring cylinder, volume was make up to 50ml with water.25 strokes were given and stand still aqueous volume measured up to 50ml and measured the foam height, above the aqueous volume was measured.

Result and Discussion:

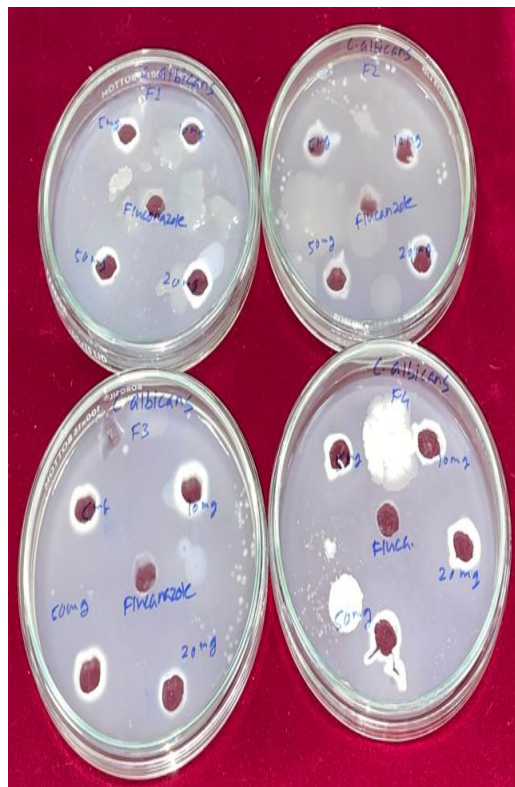
Sr.no	Evaluation Test	Neem	Murraya Koneigii (curry leaves)	Aloevera	Polyherbal
1	PH	7	7	6	6.5
2	Color	Green	Green	Faint grey	Grey

3	Odor	Pleasant	Pleasant	Pleasant	Pleasant
4	Foam height	5cm	5.4cm	4cm	5cm
5	Foam retention	32%	35%	33%	45%
6	Washability	Good washable	Good washable	Good washable	Good washable

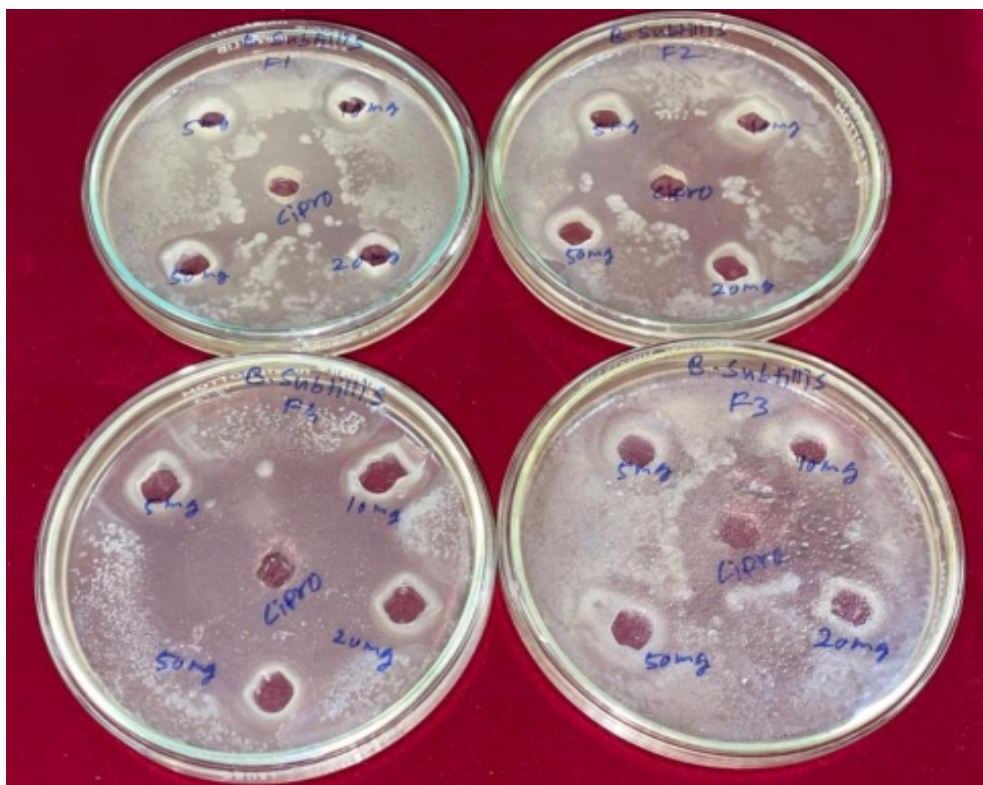
3. Anti-microbial Activity: Overnight cultures were kept ready for anti-microbial activity. Assay of the antimicrobial activity of soaps were done by Agar well diffusion method. Agar well diffusion method was used to detect antimicrobial activity. The standardized 0.1 ml saline suspension of test organisms were inoculated on the surface of sterile Nutrient agar plates. Prepared sample from different concentrations of the various soap were aseptically transferred directly into the surface of plates with the help of a sterile pipette. All plates were incubated at 37⁰C for 24-48 hours and then were examined for zone of inhibition around the well. The zone of inhibition was determined by measuring the diameter in millimeters of zone to which the soap inhibited the growth of the organism. In general soaps are used for cleaning purposes and in order to remove dust and microbes present on the surface of skin. The choice of soap varies from person to person but it should not affect the sensitive skin and it should be effective against disease causing microbes present on skin. The present research investigation was carried out to determine the antimicrobial efficacy of prepared herbal soaps like Aloe Vera, Curry leaf and Neem against skin micro flora isolates Staphylococcus aureus, Bacillus subtilis and Candida albicans. Results obtained from the experimental data revealed that prepared soaps have antimicrobial activity. We have studied the anti-microbial activity on the bacteria such as Staphylococcus Aureus, Candida Albicans, and Bacillus Subtilis bacteria cause skin infections.(9,10)



Bacillus subtilis



Staphylococcus aureus



Candida albicans

Antimicrobial activity: Zone of inhibitions

Sr. No.	Sample (Conc. mg/ml)	<i>Staphylococcus aureus</i>	<i>Bacillus subtilis</i>	<i>Candida albicans</i>
		Zone of inhibition in mm		
1.	F1			
	5	5	5	3
	10	6	8	4
	20	7	10	7
	50	6	10	9
2.	F2			
	5	5	4	6
	10	6	5	3
	20	7	7	7
	50	8	8	8
3.	F3			
	5	3	8	7
	10	5	10	7
	20	7	10	10
	50	7	12	11
4.	Polyherbal soap			
	5	No inhibition	8	2
	10	5	10	3
	20	7	12	14
	50	12	12	15
5	Ciprofloxacin	18	20	13
6	Fluconazole			18

Conclusion:

The plant *Azadiracta indica*, *Murraya Koneigii* (curry leaves) and *Aloevera* were extracted using water and subjected to various preliminary phytochemical test according to guidelines of standardization of herbals. The prepared formulations of herbal soap when tested for antimicrobial activity against different microorganisms shown good results. It does not give any irritancy to skin it was determined by using these soap by few volunteer hence it is proved that soap does not give any irritancy to skin. Furthermore, the prepared herbal and polyherbal soaps were standardized by evaluating various physico chemical properties such as pH, appearance, odor, color, foam height, foam retention and washability in which all prepared soaps exhibit satisfactory effect. The polyherbal soap shows greater zone of inhibition as compared to individual plant extract soap.

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