

Formulation and Evaluation of Antibacterial Poly Herbal Soap

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Abstract: *Most of the commercial soaps contains chemicals that can be harmful to the skin. Use of nature herbal soap can be a good alternative. Herbal products have become an item of global importance both medicinally and economically and usage of herbal products has increased, their safety and efficacy. Bacterial skin infections are most prevalent among people, requiring to have a significant attention for treatment, better skin preservation as well as to maintain good looking healthy skin. Some herbal plant extracts have antibacterial activity. The aim and objective of the present study is to formulate antibacterial poly herbal bath soap using Azadirachta indica, Ocimum tenuiflorum, Curcuma longa, Allium sativum. The antibacterial activity of the prepared formulation was tested using agar well diffusion method against the organism Staphylococcus aureus, Bacillus subtilis. The prepared polyherbal formulations exhibited a good antibacterial effect. The prepared Polyherbal soap were evaluated for various physicochemical parameters such as ph, foam retention time for which good results were observed. The easy availability of plant and their effectiveness on skin helps manufacturers with cost-effective benefits, easy availability and with less or no side effects. Because some herbal Plant extracts have antibacterial properties, the goal of this research is to make an Antibacterial poly herbal bath soap using Azadirachta indica, and curcuma longa. The polyherbal formulation was prepared then evaluation for the analysis of pH, Moisture content, saponification, foaming index, foam retention time, ethanol soluble matter and antimicrobial activity using different concentration of soap solution comparing with standard was done. Also the evaluation tests showed that the herbal soap has satisfactory antimicrobial results.*

Keywords: Skin, Polyherbal Formulation, Azadirachta indica, Ocimum tenuiflorum, Antibacterial

I. INTRODUCTION

Skin from infectious microorganisms and their spreading the skin hygiene Plays an important role to avoid the contagious diseases. This polyherbal soap help reduce healthcare-associated transmission of contagious Disease more effectively. Plants having the Medicinal properties are being used as a traditional medicine from times immemorial. The various extract from the stem, roots and leaves, of various medicinal plants have been employed as a natural remedy in curing various ailments and diseases. Even many of the plant based products have been replaced use of synthetic chemicals, the efficacy and safety of ayurvedic Products could not find their match. The many plant-based medicines have been supplanted by Synthetic chemicals, ayurvedic goods' safety and usefulness have not been proven. In comparison to chemical products treatment, herbal treatments have the benefit of being, readily available, Having less adverse effects and inexpensive The advantage of using herbal drugs is that they are Cheap, easily available and has fewer side effects in comparison to chemical Products.. As a result, research has accelerated in the direction of developing natural products for various disease treatment, that are higher in quality, less costly, and have no adverse side effects when compared to chemical products. The purpose of this study was to develop Poly-herbal bath soap using extracts of Azadirachta indica, Ocimum tenuiflorum and curcuma longa, and investigate the antibacterial/antimicrobial activity of the extract against Important causative bacteria. Additionally, to analysis the physicochemical properties of the prepared polyherbal formulation in order to standardize and commercialize it.

II. SOAP

Generally soap is a mixture of sodium salts of various natural Fatty acids.



Fig 1-Purpose of Skin Cleansing

2.1 Types of Soap Preparation

A. Melt and Pour Soap

Technically, all handmade soap is “Glycerin Soap.” In much Commercial soap, all the extra glycerin is harvested out. Thus, all handmade soap is glycerin rich .Generally, the clear soap has extra Glycerin added to it to produce a very nourishing, Moisturizing bar. Glycerin is a “humectant.” It provide moisture to skin; the theory is that if you wash with Glycerin soap, a thin layer of glycerin will remain, drawing Moisture to your skin. Clear soap base can be purchased in large blocks to be Melted down, colored and fragranced, and placed into molds. Because of its ease of use Melt and Pour soap making is Gaining in popularity .This method involves all the Aspects of cold process soap making, but takes it a few steps such as adding alcohol for clarity and a glycerin and Sugar to suspend and enhance the clarity of the soap.

B. Cold Process Soap

Cold process soap is made by combining fatty acids and sodium hydroxide (lye) together the Fatty acids used can be almost any oil. In the cold process soap making there some portion of sodium hydroxide and water that forms a chemical reaction called .It is hard, long lasting quality technique.

C. Hot Process Soaps

There are variations on the cold process method. In Hot Process soap take all your Ingredients, and add them to a pot (that is then placed over a Heat source, such as a stove) and stir frequently until the Soap goes through various stages in this process the excess water is Evaporated off .

D. Rebatching Soaps

Rebatching, also called French milled, or triple milled soap, Is another form of cold process Soap making. Making cold process soap from scratch, grate it up, place it Over a heat source, in a kettle, with a little liquid, and the mixture melts down into a mushy Mess you can add fragrance and colorant to it .This method Is often used to preserve the scent or the healing properties Of some essential oils.

III. MATERIALS AND METHODS

3.1 Materials

Plant Profile

Neem

Botanical name- Azadirachta indica.

Kingdom: Plantae

Family: Meliaceae

Part typically used- Leave.

Color- Green.

Chemical Constituents- flavonoids, Alkaloids, Azadirone, nimbin, nimbidin, terpenoid, steroids.

Uses –Treat dry skin and wrinkles, Heal wounds,Treat acne,Minimize moles, Stimulate collagen production, Reduce scars



Fig 2 - Neem

Tulsi

Biological name- Ocimum tenuiflorum.

Kingdom:-Plantae

Family:-Lamiaceae

Common name- holy basil, tulsi or tulasi

Chemical constituents-Oleanolic acid, Rosmarinic acid , Linalool, and β -caryophyllene, Eugenol, Carvacrol, Ursolic acid.

Part typically used- leaves.

Colour- Green.

Used:-Tulsi can help cure fever.

Tulsi is used to blackheads, treat skin problems like acne, and premature ageing heart diseases, many types of insects bites. Tulsi is also used to treat respiratory problems, Anti-aging, Treats Kidney Stones, Relieves Headaches, Fights Acne.



Fig 3 - Tulsi

Turmeric

Biological name: Curcuma longa

Kingdom:-Plantae

Family:-Zingiberaceae

Common name: haldi

Part typically used: root

Colour- yellow

Used:-Could Help Heal Acne, Deals With Dull Skin.

Could Help Psoriasis and Eczema.

This works on several levels Lightens Hyperpigmentation.

Protects Against Environmental Damage.

Prevents Premature Aging.

Upper respiratory tract, joints, and digestive system



Fig 4 – Turmeric

Alovera

Biological name- Aloe Vera.

Kingdom: Plantae

Family: Asphodelaceae

Common name- Gwar Patha or Ghrit Kumari, Aloe barbadensis Miller.

Chemical constituents- minerals, sugars, vitamin A C E , lignin, saponin, enzyme, salicylic acid and amino acid.

Part typically used- leaves

Color- Green

Uses-Psoriasis.Seborrhea.Dandruff.Minor burns. Skin abrasions. Skin injured by radiation. Herpes sores. Acne.



Fig 5 – Alovera

IV. METHODOLOGY

Selection of Plant

In the present study, I have selected the plant Azadirachta indica(Neem),Ocimum tenuiflorum (Tulsi).

Collection of Plant material:

The Azadirachta Indica (Neem) & Ocimum tenuiflorum (Tulsi) leaves were collected from the Samarth Institute Campus situated in village of Bangarwadi,Belhe.

Preparation of Herbarium:

After that we have prepared herbarium of *Azadirachta indica*. For the herbarium the plant specimens are properly dried, pressed & mounted on sheets.

Preparation of Powder:

The flowers petals were dried under shade for about 2 weeks and then made into powdered form using mortar and pestle then sieved.

Extraction

The *Azadirachta indica*, *Ocimum tenuiflorum*, was extracted with water by decoction process 10 gm of above stated powder was taken in conical flask and extracted with water for 5 hours with occasional agitation.

Preparation of Basic Glycerine Soap

The lye solution was produced by blending sodium hydroxide (15.7 gm) with distilled water (32.7 gm) in a nonmetallic pan and heating it below 50°C until it became transparent, then cooling it. The addition of lye solution was done, which was produced by boiling palm oil, coconut oil, and castor oil.. Place the cover on the slow cooker and simmer for many hours (about Hours) until the soap mixture becomes translucent. Pour the alcohol and glycerine into it.. Allow the soap to simmer for about 30 minutes, covered and sealed. The already prepared sugar solution at low temp is after 30 min, in which the sugar entirely dissolved in the water. Then I gently poured glycerine soap into the soap moulds. The mixture in soap moulds was allowed to cool to and get solidified in refrigerator.

Sr no	Ingredients	Quantity
1	Distilled water	49.7gm
2	Sodium hydroxide	15.7gm
3	Palm Oil	34.0gm
4	Coconut oil	35.3gm
5	Castor oil	34.0gm
6	Glycerine	19.6gm
7	Ethyl alcohol	38.0gm
8	Sugar	23.6gm

Table 1- Formulation table of Glycerine Soap

Procedure of Polyherbal Soap Formulation

The small pieces of the prepared basic glycerine soap were put into a pan and melted on a water bath At a temperature below 60°C. Neem ,Tulsi, turmeric extract were added after that all of the components such as honey, aloe vera, ethanol, stearic acid were combined together. The liquids Was poured into the mold, which was then allowed to harden at room temperature And evaluated the various parameters of soap.

Ingredients	Quantity	Uses
Soap Base	75gm	
Neem Extract	4gm	Antibacterial
Tulsi Extract	1gm	Anti-viral
Alovera Gel	2gm	Anti-aging
Turmeric	0.5gm	Antibacterial
Honey	1 gm	Antibacterial
Sandalwood Oil	5 to 7 drops	Perfume
Shikekai	1gm	Cleanser
Stearic Acid	1gm	Hardening

Ethanol	5ml	Solvent
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Table 2: Formulation table of polyherbal soap.



Fig 6 – Formulated Polyherbal Soap.

Evaluation of Physicochemical Parameters of the Prepared Polyherbal 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.

Determination of Percentage Free Alkali

For the determination of the percentage free alkali in the conical flask 5 gm 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 0.1ml of HCL solution.

Foam Height

Dissolved 0.5 gm of soap in distilled water then With distilled water in 100 ml measuring cylinder make up the volume up to 50 ml. By giving 25 strokes the volume of foam height was measured.

Foam Retention

In the 100 ml of measuring cylinder transfer the Prepared the 25 ml of the 1% soap solution . Then the cylinder was shaken 10 times. The volume of foam retention was recorded.

Alcohol Insoluble Matter

For alcohol insoluble matter testing dissolve 5 gm of prepared soap in warm ethanol. Then filter the solution with a tarred filter Paper. At 105°C the tarred filter paper was dried in hot air oven. Then the weight of the dried tarred filter was taken.

Accelerated stability testing:

The produced PHF was subjected to accelerated stability testing at room temperature for one week before being Investigated at 50°C for 2 months. On the 0th, 10th, 20th, 30th, 40th, 50th, 60th days, The produced PHF were stored at room temperature and monitored on the daily bases.

Determination of total fatty matter (TFM)

The total fatty matter test is carried out by reacting the Soap with acid in the presence of hot water and measuring acids. About 10 g of the finished soap added in 150 ml distilled water and Heated. The soap was dissolved in 20 ml of 15 % Sulphuric Acid while heating until a clear solution was appeared By adding 7g bee wax the Fatty Acids on the surface of the resulting solution was solidified and is reheated. The Cake was Formed and removed and dried and weighed to obtain the total fatty matter Using a formula:

$$\%TFM = (A - X)/W \times 100$$

Where; A= weight of wax+ oil, X= Weight of wax, W= weight of polyherbal soap.

Determination of Moisture Content

About 10g of the sample under study was kept in a hot air oven at 100 – 105°C for an hour. Then, the sample was weighed along with the china dish to Deduct the actual weight of tarred china dish. The weight Of the content was noted to calculate the percentage of the moisture content by using the formula given below.

Moisture content.

$$\text{Moisture content} = (\text{Difference in weight of soap /initial weight of soap}) \times 100.$$

Sr no	Physico chemical parameters	Herbal Soap Result
1	Apperance	Green
2	Odour	Pleasant smell
3	Texture	Solid and Smooth
4	% Free Alkalie	0.27
5	Foam height(cm)	2.5cm
6	Foam retention	15min
7	Alcohol Insoluble Matter	18.0
8	Ph	7.72
9	High temperature stability soap melts above	450
10	Saponification value	161.27g/ml

Table 3 – Results of evaluation parameters of antibacterial polyherbal soap

In-Vitro Antimicrobial Activity of Polyherbal Soap:

Antimicrobial screening was performed on the produced herbal soap using the agar well diffusion Technique. Staphylococcus aureus, and Bacillus subtilis were the organisms used. The antibacterial Properties of 1 gm of soap combined with 5 ml of DMSO were studied. The plates were incubated at 37°C For 24 hours to evaluate the inhibition zone.

Sr no	Organism	Zone of inhibition
1	Staphylococcus aureus	20mm
2	Bacillus subtilis	26mm

Table 4 – Antimicrobial screening of prepared formulation.

V. RESULT

Preparation and evaluation of polyherbal soap was done .The physicochemical parameters of the prepared soap were determined. The formulations exhibited good as appearance characteristic as well as the pH was found in the range 7.72 which is the desired pH. Other parameters such as percentage Free Alkalie, Foam height, Foam retention, Alcohol insoluble matter, and high temperature stability were determined. The various parameters results are tabulated.. The table depicts that the pH of the herbal formation was 7-8 which was optimum for its utilization on the skin. Higher as well as lower skin pH refers to the harmful effects on the skin. The foaming index of the given herbal formulation was found to be 16.5 while the foam retention time was found to be 15 minutes. This means the lather producing ability of the soap was satisfactory and stable. The total fatty mater determination was 72%. The quality of prepared soap is represented by the total fatty matter present in it. If the total fatty matter is lower, then it is not optimum for the dry skin. Greater the fatty matter more it helps in moisturizing the skin (Ara et al., 1990). The saponification value was found to be 161.287

mg/ml, and the percentage of moisture content in the herbal soap was evaluated to be 3.5%. Greater the moisture, more will the deterioration of the sample. The ethanol soluble matter was found to 63.80% as shown in table 2. In addition, the antimicrobial testing was successfully performed as shown in the table 4 with successful inhibition of the microorganism *S Aureus* & *Bacillus Subtilis*.

VI. CONCLUSION

Neem has been Extensively used in Ayurveda, Unani and Homoeopathic medicine and has become a admiration of Modern medicine. Neem elaborates a vast biologically active compounds that are structurally complex and Chemically diverse. Poly herbal soap were prepared by using cold process technique. The prepared formulation showing good physical characteristic. Formulation provide excellent foaming property, free from alkali components on the basis of it's evaluation parameters. The microbiological study results gives the formulation having antimicrobial property by conducting antimicrobial activity. Therefore based on the study research it can be concluded that polyherbal can be effectively formulated as in the form of soap which having excellent antibacterial property on the skin .The plant *Azadirachta indica*, *Ocimum tenuiflorum* were extracted by water and subjected to various evaluation test. The prepared polyherbal soap formulation when tested for different test gave good results. It does not give any irritancy to skin it was determined by using these soap hence it is proved that soap does not give any irritancy to skin.

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