Formulation And Evaluation Of Herbal Antimicrobial Soap

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Abstract

Herbal products have become an item of global importance both medicinally and economically. Although usage of these herbal products has increased, their quality, safety and efficiency are serious concerns in industrialized and developing countries. The present research has been undertaken with the aim to formulate and evaluate the pure herbal formulation. A herbal soap was formulated using the leaf and bark extract of Azadirachta indica, tulsi Ayurvedic cosmetics are also known as the herbal cosmetics the natural content in the herbs does not have any sideeffect on the human body. Most herbal supplements are based on several botanical ingredients with long histories of traditional or folk medicine usage. Among the numerous botanical ingredients available in the market today. Numerous chemical toxins microorganism present in the atmosphere may cause chemical infection and damage to skin cosmetics alone are not sufficient to take care of skin and body parts. Neem (Azadirachta indica) tree has attracted worldwide prominence owing to its wide range of medicinal properties, neem leaves and its constituents have been demonstrated to exhibit anti-inflammatory, antihyperglycemic, antineelear antimalarial, antifungal, antibacterial, antimutagenic and anticarcinogenic properties. This study was conducted to evaluate the effect of aqueous, ethanolic and ethyl acetate extract from neem leaves. The physicochemical parameters of formulations (Physical evaluation, pH, Foaming ability and foam stability) were determined. The results showed that formulation have pH level nearly equal to skin pH, Foaming index is excellent.

Index Terms – Neem, Tulsi

AIM AND OBJECTIVE :

Aim :
To study the formulation development and evaluation of herbal antimicrobial soap of neem (Azadirachta indica) & tulsi (Ocimum tenuiflorum).

Objectives:
The ultimate aim of this study is to formulate and evaluate the herbal antimicrobial soap using extracts of plant having ethnic and dermatological importance in Ayurveda, namely, Neem Azadirachta indica, and Tulsi Ocimum tenuiflorum.
To study the evaluative parameters such as :-

1) pH
2) Foam retention
3) Foam height
4) Moisture Content
5) Cleansing Ability
6) Skin Irritation

I. INTRODUCTION

Herbal soap preparation is a medicine or drugs it contain Antibacterial & antifungal agents which e mainly uses of part of plants such as like leaves, stem, roots & fruits to treatment for a injury or disease or to achieve good health. Herbal cosmetics are also known as —Natural cosmetics. Herbal cosmetics are products which are used to purify and beautify the skin.

The main advantage for using an herbal cosmetic is that it is pure and does not have any side effects on the human body; instead enrich the body with nutrients and other useful minerals. Soap is a solid product made from oil by means of saponification. Neem leaf and its extract exhibits immunomodulatory, anti-inflammatory, antiulcer antimalarial, antifungal, antibacterial, antioxidant, anticarcinogenic property. Tulsi is called the queen of all herbs, it is used widely in Ayurvedic and naturopathic medicines which helps in the healing of the human body in a natural manner. Not only do Tulsi leaves benefit people, but their flowers too. Tulsi can help you get rid of many health problems ranging from fever to kidney stones. The present scenario, it seems improbable that herbal soaps, although better in performance and safer than the synthetic ones, will be popular with the consumers.

Soaps and detergents have been registering steady growth in demand in the country, in tune with the industrial and economic growth. Herbal soap has generated considerable interest and enthusiasm amongst the consumers in recent times, due to eco-friendly nature of the product. There is good scope for setting up herbal soap projects in the country. While there is no particular entry barrier from the point of view of technology, adequate market thrust is necessary to competitively sell the product in the market. The toilet soap consumption in India is estimated at 120000 tonnes per annum. The soap market is growing at the rate of about 9% per annum.
Plan Of work :-

- Literature Review
- Selection Of Drug Material
- Study Of Monograph And Chemical Constituents
- Extraction Of Crude Drugs
- Preparation Of Cream Base
- Incorporation Of Essential Oil Into Soap Base
- Formulation Of Soap
- Evaluation Test

LITERATURE REVIEW:

Ashlesha Ghanwat, Sachin Wayzod and Vanjire Divya (in year 2020) The plant Azadiricta india, Ocimum tenuiflorum, Sapindus mukorossi and Acacia concinna were extracted using water and subjected to various evaluation test according to previous research the antimicrobial activity of Neem was studied. The prepared formulation when tested for different test gave 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. Further more the prepared soap were standardized by evaluating various physico chemical properties such as pH appearance odour in which the exhibit satisfactory effect.
Satish Kumar Sharma1 and Suruchi Singh (in year 2020) In the prior studies it was noted that Nosocomial infection has been recognized as a crucial issue in the outcome of hospital care, resulting in significant morbidity and mortality. The primary routes of infection transmission to patients are the hands of health-care workers. Many of the antiseptics are sanitizers that dependent on alcohol and can have deleterious effects. Their regular use can cause irritation of the skin. Therefore, herbal hand-wash was prepared using herbal extract T. catappa, C. longa and G. indica. The present results indicate that the ingredients of T. catappa, C. longa and G. indica extracts and their combinatorial compositions are capable of developing better antiseptic hand-wash against skin pathogens than the commercially available preparations. Therefore, a new way, of combating antibiotic drug resistance of pathogenic organisms and healthier living by germ-free aseptic hands can be found. A significant number of microbial load can be reduced by natural, economic and safe handwash. This may serve as the reasonable basis for the preparation of the herbal hand-wash. This has opened new avenues in the production of ‘antiseptic hand-wash’ replacing the use of chemical substances.

Rakesh K. Sindhu 1, Mansi Chitkara2, Gagandeep Kaur1, Arashmeet Kaur1, Sandeep Arora1 and I.S. Sandhu (in year 2019) The evaluation parameters carried for standardizing the herbal soap by color determination, pH, TFM, ethanol soluble content, Saponification value were carried out. This led to an outcome of the formulation of stable Polyherbal soap possessing potent antimicrobial activity against various micro-organisms such as E. coli and S. aureus. In addition this formulation was found to be used for daily use and did not cause any skin irritation. The blends of various oils in this soap formulation helped in providing specific activity to the formulation possessing potent medicinal properties (Ameh et al., 2013)

CONTENTS OF THE SOAP :-

NEEM

Monograph :-

- Common Name – Neem.
- Scientific Name- AzadirachataIndica.
- Biological Source- Almost all part of plant AzadirachataIndica.
- Family- Meliaceous, the mahogany family

Fig: Neem
Neem is an omnipotent tree and a sacred gift of nature. Neem tree is mainly cultivated in the Indian subcontinent. Neem is a member of the mahogany family, Meliaceae. Today it is known by the botanical name Azadirachta indica (A. indica) SarvaRogaNivarini – the curer of all ailments! Role of AzadirachtaIndica is as a wonder drug is stressed as far back as 4500 years ago.

Importance of NEEM :-

- Some of its health restoring benefits Effective in skin infection, rashes & pimples.
- Immunity booster, Anti obesity, Blood purifier for beautiful & healthy skin, Anti diabetic, Anti viral, Dispels intestinal worms and parasites, Malaria, Piles, Hair disorder & Oral disorders.
- Neem is rich in fatty acids, including oleic, stearic, palmitic, and linoleic acids.
- Neem is used to treat psoriasis and eczema.
- Neem has been used to treat acne, reduce blemishes, and improve skin elasticity neem
- Neem leaf extract accelerates wound healing through an increased inflammatory response and the formation of new blood vessels.

Constituents :-

a) Flavonoids,
b) Alkaloids,
c) Azadirone,
d) Nimbin,
e) Nimbidin,
f) Terpenoids

- Steroids,
- Margosic acid,
- Vanilic acid,
- Glycosides,
- B-sitosterol,
- Nimbectin,
- Kaempeerol,
- Quercurserti

are present in Neem Leaf.

Tulsi :

- Common Name – Tulsi
- Scientific Name- Ocimum tenuiflorum
- Biological Source- leaves Of Tulsi
- Family- Lamiaceae
- Kingdom- plant
Tulsi is called as the Holy Basil in India with reference made to it in the Holy Scriptures. Its native India, it has been cultivated for nearly 2,000 years. Healers call it tulsi, the Queen of Herbs, the "Incomparable One," and it is prominent in Ayurveda and Hinduism for its various therapeutic applications. For skin care, the properties come it's impressive antioxidant abilities and for how it acts as a stress relieving agent.

**IMPORTANCE OF TULSI :-**

- Owing to its healing, antibacterial, antifungal anti-inflammatory properties
- Tulsi benefits the skin by preventing blackheads, acne and relieves skin infections, to name a few.
- Rich in vitamin K and antioxidants
- Tulsi benefits hair by stimulating blood circulation and promoting hairgrowth amongst others.
- Tulsi has skin and hair benefits. It contains camphene which works as a natural toner to remove excess oil in the skin.
- Tulsi neutralizes free radicals and rejuvenates the skin, reviving the youthful glow.

**Chemical Constituents Of Tulsi Are:**

- Oleanolic acid
- Ursolic acid
- Rosmarinic acid
- Eugenol, Carvacrol
- Linalool
- β-caryophyllene
- vitamin A
- vitamin C

**Benefits And Characteristics of Neem and Tulsi Soap :-**

- Natural Soap is Highly Moisturising.
- Better Ingredients Used.
- Cruelty-Free and Animal-Friendly.
- Wider Choice.
- Better for the Environment.
- Rich in Antioxidants.
- Acts Against Free Radicals
- It is smooth, soft and gentle without leaving a residue or sticky film
- Rejuvenates the skin, reviving the youthful glow.
A Herbal soap should have the following characteristics:

- It should remove dirt and sweat from your body.
- It should leave your skin feeling clean and refreshed.
- It should nourish and soften your skin.
- It should purify and protect skin from environmental damage.
- It should moisturize your skin.
- It should have a pleasant odour.

**FORMULATION AND MATERIALS :-**

**Formulations of Lye :-**

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>F1</th>
<th>F2</th>
<th>F3</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAOH</td>
<td>0.8gm</td>
<td>1.6 gm</td>
<td>3gm</td>
<td>Saponify oils</td>
</tr>
<tr>
<td>Propylene glycol</td>
<td>9.3ml</td>
<td>18.7ml</td>
<td>15ml</td>
<td>Penetratio-n enhancer</td>
</tr>
<tr>
<td>Glycerine</td>
<td>3.1ml</td>
<td>6.25ml</td>
<td>8ml</td>
<td>Humectant</td>
</tr>
<tr>
<td>Ethanol</td>
<td>9.5ml</td>
<td>19 ml</td>
<td>12ml</td>
<td>Solvent</td>
</tr>
<tr>
<td>Sodium lauryl sulphate</td>
<td>7.5gm</td>
<td>15 gm</td>
<td>10gm</td>
<td>Surfactant</td>
</tr>
</tbody>
</table>

**Formulation of Soap :-**

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>F1</th>
<th>F2</th>
<th>F3</th>
<th>Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steric acid</td>
<td>6.5gm</td>
<td>8gm</td>
<td>10gm</td>
<td>Hardening</td>
</tr>
<tr>
<td>Neem extract</td>
<td>3ml</td>
<td>6ml</td>
<td>8ml</td>
<td>Antimicrobial</td>
</tr>
<tr>
<td>Tulsi extract</td>
<td>2ml</td>
<td>4ml</td>
<td>6ml</td>
<td>Antioxidant</td>
</tr>
<tr>
<td>Menthol</td>
<td>2gm</td>
<td>3.4gm</td>
<td>5gm</td>
<td>Perfume/cooling agent</td>
</tr>
</tbody>
</table>

**Materials**

<table>
<thead>
<tr>
<th>MATERIALS</th>
<th>SOURCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neem</td>
<td>Plant</td>
</tr>
<tr>
<td>Tulsi</td>
<td>Plant</td>
</tr>
</tbody>
</table>
Plant Materials :-

Neem :-
- The Neem leaves were collected from different matured plant.
- Cracked and dry skin can be moisturised and made smooth by using neem.
- It acts as an Antibacterial, Antifungal, Antioxidant agent.
- Neem has been used to treat acne, reduce blemishes, and improve skin elasticity.
- Neem is rich in fatty acids, including oleic, stearic, palmitic, and linoleic acids.

Tulsi :-
- Tulsi is well known for its myriad medicinal properties antibacterial, antifungal, antipyretic, antioxidant, antiseptic and anticancer. Helps beat stress. Tulsi is a natural herb with anti-stress qualities.
- Tulsi is rich in Vitamin C and zinc, Rich in vitamin K and antioxidants.
- Tulsi benefits the skin by preventing blackheads, acne and relieves skin infections.
- It contains camphene which works as a natural toner to remove excess oil in the skin.
- Tulsi neutralizes free radicals and rejuvenates the skin, reviving the youthful glow.

Chemical
- Glycerine is a nontoxic, odorless, and colorless liquid.
- Glycerine is used as a humectant in soap products.
- Glycerine will make sure that your skin will maintain its own moisture in order to protect it from damage caused by dryness.
- It can increase skin hydration, relieve dryness, and refresh the skin's surface.
- It's also an emollient, which means it can soften skin.

Ethanol :-
- Ethanol is most often used when making glycerin soap.
- Ethanol has the ability to dissolve on a partial level in water and oil.
- It helps in making soap transparent.
- Ethanol can be used as Antiseptic, Antidote and as Medicinal solvent.

Steric Acid :-
- Stearic Acid helps to harden products, such as candles and soap bars.
- It's usually used as a thickening agent.
- Stearic acid is an emulsifier, emollient, and lubricant.
- Stearic acid is used mostly in the manufacture of soaps, detergents, and several other cosmetics such as shaving creams and shampoos.

sodium lauryl sulphate :-
- Sodium lauryl sulfate (SLS) is a surfactant.
- sodium lauryl sulfate helps to stabilize and thicken solutions with ingredients
- improves solubility.
- It allows products to achieve a more uniform texture for easier, and smoother application.
- It makes soap foamier.
Menthol:

- Menthol is an organic compound, more specifically a monoterpenoid, made synthetically or obtained from the oils of corn mint, peppermint, or other mints. It is a waxy, clear or white crystalline substance, which is solid at room temperature and melts slightly above. Wikipedia

  - Formula: C10H20O
  - Boiling point: 212 °C
  - IUPAC ID: (1R,2S,5R)-2-isopropyl-5-methylcyclohexanol
  - Density: 890 kg/m³
  - Molar mass: 156.27 g/mol
  - Classification: Organic compound

PROCEDURAL

EXTRACTION: -

- The Azadiricta indica powder, and Tulsi leaves was extracted with water by decoction process.
- 9 gm of above stated powder of neem and Tulsi leaves were taken in separate conical flask and extracted with water for 40-60 min with occasional agitation.
- Then filtered.

Preparation of lye: -

- Lye solution was prepared by mixing 0.8g NaOH and 1.5ml DI H2O in 125ml beaker.
- Measure 9.3ml Propylene glycol, 3.2ml Vegetable glycerine
- Add 9.5ml 95% Ethanol solution, 7.5g Sodium lauryl sulfate into 250ml beaker on hot plate with stir bar.
- Heat mixture to 60°C.

Preparation of Soap: -

- 6.5g Stearic acid and heat mixture to 68°C.
- When at temperature slowly add the 50:50 lye solution and mix for 20 minutes while continuously stopping and starting stirring until mixture becomes transparent.
- Further required quantity of Azadirachta indica and Tulsi extract was mixed to the above mixture and volume made up to 100 ml by adding remaining distilled water.
- Let solution sit for 1 hour at 68°C.
- Few crystals of menthol were also added to impart aroma to the prepared soap.
Let soap solution cool to 62-64°C and pour into soap mold, let cool and harden.

EVALUATIONS OF HERBAL SOAP :-
The herbal soap formulated was evaluated for the following:

1. Physical evaluation
2. pH
3. Foam retention
4. Foam height
5. Moisture content
6. Cleansing ability
7. Skin irritation test
8. Physical Ability :

1. Physical evaluation :

Physical characteristics such as color and appearance were checked by naked eye. Odor was identified by smelling.
1. Colour : Green
2. Odor : Pleasant
3. Appearance : Good

2. pH :
The pH was determined by using pH paper. The pH was found to be basic in nature.

1. Foam retention :

Foaming ability and foam stability: Cylinder shake method was used to test for the foaming ability. 50 ml of the 1% formulated products solution was placed into a 250 ml graduated cylinder, covered with one hand and shaken for 10 times. After 1 min of shaking, the total volume of the foam content was recorded. Foam stability was valued by recording the foam volume after 1 min and 4 min of shake test.
2. **Foam height:**

0.5 g of sample of soap was dispersed in 5 ml distilled water. Then, transferred it into 10 ml measuring cylinder. Five-eight strokes were given and allowed to stand still and the foam height above the aqueous volume was measured.

![Image of foam height measurement](image)

**Fig.2 : - Foam Height**

1. **Moisture content:**

The moisture content was used to estimate the percentage of water in the soap by drying the soap to a constant weight. The soap was weighed and recorded as — wet weight of sample and was dried from 100 to 115°C using a dryer [21]. The sample was cooled and weighed to find the — dry weight of sample. The moisture content was determined using the formula

\[
\text{% Moisture content} = \frac{\text{Initial weight} - \text{Final weight}}{\text{Final weight}} \times 100
\]

2. **Cleansing ability:**

A dirty cloth was soaked in a bucket containing soap solution and rinsed slowly and the dirt removed from the cloth was observed.

3. **Skin Irritation Test:**

Soap was applied on skin of hands and legs of 5 volunteers and observed.

4. **Physical Ability:**

When soap is placed in a hot temperature for more than 10-15 min it enters into gel phase and the colour becomes vibrant.

**RESULT AND DISCUSSION :**

**Result :**

Among all the formulations the formulation f2 in both table 1 and 2 exhibited good result.

The physicochemical parameters such as color, odor, appearance, and pH were tested. The pH of the soap was found to be 6.5 with pH strip. Remaining parameters such as foam height, foam retention moisture content, and were also determined.

Foam Height was found to be: 2.5 Foam Retention was found to be: 5 min. Moisture Content in soap is: 6.66%

**Discussion:**

The present work is concerned with the formulation of soap using extract of neem and Tulsi. The formulated soap was a dry, stable solid showing no colour change and good appearance and is foamy in nature. It showed good skin compatibility and causes no irritation when tested on 5 volunteers.
CONCLUSION:

The formulated soap showed considerable antibacterial activity as the commercial standard and all the other parameters were good.

The plant Neem and Tulsi were extracted using water and subjected to various evaluation tests according to previous research the antimicrobial activity of Neem was studied, the prepared formulation when tested for different test gave 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 soap were standardized by evaluating various physico-chemical properties such as pH appearance odour in which the exhibit satisfactory effect. The soap was free from harsh chemicals which are used in commercial soaps. Herbal soap can be used as a promising alternative to commercial chemical containing skin whitening soaps.

THE FOLLOWING ARE THE CONCLUSIONS DRAWN FOR THE PERFORMED THESIS

- Herbal soap containing natural ingredients was successfully formulated by using three different formulations (F1-F3).
- Among all the three formulation F2 formulations exhibited good results.
- F2 soap containing natural ingredients was found to be in compliance with all the evaluation tests.

REFERENCE:

'preparations for their disinfectant effects, I (1), 54-65