Formulation and Evaluation of Poly Herbal Anti Bacterial Soap
G. Sucharita1, V. Ganesh2, B. Siva Krishna3, D. Sireesha4, S. Pavan kumar5, N. Sai Sasidhar6, S. Revathi7, Dr. P. Venkatesh8
B. Pharmacy1, 2, 3, 4, 5, 6, Assistant Professor7, Professor8
Department of Pharmaceutical Sciences
Jagan’s Institute of Pharmaceutical Sciences, Andhra Pradesh, India

Abstract:
Bacterial skin infections are most common amongst people, requiring significant attention for treatment and also to maintain 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 curcuma longa[Turmeric], azadirachta indica [Neem oil], the anti bacterial soap prepared against the organism staphylococcus aureus by using a cold process method. The prepared formulation were evaluated for various physicochemical parameters for good characteristics were observed. The easy availability of plant and their effectiveness helps manufactures with cost-effective benefits and with less or no side effects.

Key Words: Curcuma longa, azadirachta indica, anti bacterial soap, herbal extracts, staphylococcus aureus.

I. INTRODUCTION:
The skin or cutaneous membrane covers the external surface of the body. It is the largest organ of the body in surface area and weight. The function of the skin is body temperature regulation, a reservoir for blood, protection from the external environment, cutaneous sensations, excretion and absorption, and vitamin D synthesis.

Skin is the most exposed part of the body to the sunlight, environmental pollution and also to some protection against the pathogens. The most common skin disorders are eczema, warts, acne, rashes, psoriasis, allergy, etc. Staphylococcus aureus (S. aureus) is a Gram-positive bacterium that can live as a commensal organism on the skin and in the nose and throat. Aureus causes Approximately 30% of healthy people are asymptomatically colonized by S. aureus. a range of infections, from minor skin infections to abscesses, endocarditis, and death.S. aureus is also a major cause of food poising induced by heat resistant enterotoxin A and is a leading cause of nosocomial infections.

To protect the skin from infectious microorganisms and their spreading the hand hygiene plays an important role to avoid the contagious diseases. Many of the chemicals anti-septics are now available in the market as alochol based sanitizers, Chlorohexidine products, etc. This poly herbal soap or solution help reduce healthcare-associated transmission of contagious diseasae more effectively but they have some shortcomings or adverse effects.
Table 1: Structure and function of skin

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Epidermis</th>
<th>Dermis</th>
<th>Subcutaneous</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structure</td>
<td>Superficial part of the skin; stratified squamous epithelium; composed of four of five strata</td>
<td>Deep part of the skin; connective tissue composed of two layers</td>
<td>Not part of the skin; loose connective tissue with abundant deposits of adipose tissue</td>
</tr>
<tr>
<td>Functions</td>
<td>Prevents water loss and the entry of chemicals and microorganisms; protects against abrasion and ultraviolet light produces Vitamin D; gives rise to hair, nails, and glands</td>
<td>Is responsible for the structural strength and flexibility of the skin; the epidermis exchanges gases, nutrients, and waste products with blood vessels in the dermis</td>
<td>Attaches the dermis to underlying structures; adipose tissue provides energy storage insulation, and padding; blood vessels and nerves from the subcutaneous tissue supply the dermis</td>
</tr>
</tbody>
</table>

SOAP:
Soap is a mixture of sodium salts of various naturally occurring fatty acids.

INTRODUCTION FOR SOAP:
Soaps are carboxylate salts with very long hydrocarbon chains. Soaps can be made from the base hydrolysis of a fat or oil. It is used as a surfactants for washing, bathing and cleaning but used in textile spinning for lubricants. Saponification is the process in making the soap by reaction of triglyceride fats are hydrolyzed into free fatty acids then it will combine with alkali to form crude soap

Hydrolysis reaction:

\[\text{Fat or oil} + \text{NaOH} \rightarrow \text{Glycerol} + \text{Sodium salts of fatty acid}\]

Herbal cosmetics:
Nowadays, herbal extracts are used in the cosmetic preparations for augmenting beauty and attractiveness. Therapy with herbal drugs is an old traditional medicine. • They serve as cosmetics for the care of body and its part and • The botanical ingredients influence biological function of the skin and provide nutrients necessary for the healthy skin.

REVIEW OF LITERATURE

1) Abayeh, O.J, Aina, E.A. et al (1998): Soaps are the sodium salts or potassium salts of stearic acids or any other fatty acids. They are prepared by the saponification process, which is, reacting the oil which contain triglycerides with caustic soda (NaOH) to give the soap. However different oils have different composition of fatty acids which are responsible for different properties of soaps made out of them. In the present work 5 different types of oils are taken.

2) Faicel, R. et al (2008): Several medical soaps with antiseptic properties and washing commercial soaps were analyzed to compare the values on quality criteria for different characteristics. A comparison of results on the pH, the content of total fat, free alkalinity/acidity, chloride content, foam height and alcohol insoluble with the quality criteria have shown clear differences.

3) Chukwulozie po. et al (2014): antibacterial activity of the extracts was determined by the disk diffusion assay against B. cereus, S. typhimurium, S. aureus and E. coli. The Folin Ciocltetur (FC) assay and the DPPH radical scavenging assay were used to obtain the antioxidant capacity (AOC) and the percentage radical scavenging activity respectively. An antibacterial liquid soap and an antioxidant liquid soap were prepared using the adhatoda leaf extracts and these bioactivities of the prepared medicinal soaps were determined with respect to their control soaps. Furthermore, phytochemical analyses of the bioactive extracts were carried out to investigate the presence of different secondary metabolites.

4) Aulet de Saab, et al (2001): This study aims to check the antibacterial activity of various branded soaps against bacteria that are normally present in the environment. The proposed study includes selection of most common bacterial strains from the environment. Identification of bacterial strains was done by standard microbiological techniques, which include gram staining, biochemical testing and advanced identification by analytical profile index. Determination of minimal inhibitory concentration and minimum bactericidal activity of strains was performed by tube and microtitration method.

5) Warra A. A, Hassan L.G. et al (2010): The present study was carried out to prepare medicinal soaps with antibacterial and/or antioxidant activities using leaf extracts of pomegranate. Leaf extracts of pomegranate were obtained by maceration, soxhlet extraction and sonication using a series of solvents. The extracts were screened for antibacterial activity using the disk diffusion assay carried out against B. cereus, S. typhimurium, S. aureus and E. coli. The Folin Ciocltetur (FC) and DPPH radical scavenging assays were used to determine the total antioxidant capacity (AOC) and the DPPH radical scavenging activity (RSA) respectively.

6) A. Oyediran, et al. (2014): Rubber (Hevea brasiliensis] hexane as the solvent, its physical and chemical characteristics were determined to evaluate its potential as viable 20.75% oil yield. The rubber seed oil was characterized for pH, acid value, saponification value, iodine value, flash point, fire point, kinematic viscosity and refractive index using standard methods. The Results for acid value, saponi value, iodine value, flash point, fire point, kinematic viscosity, refractive index, pH and specific gravity are 173.29, 189.62, 233.26, 110°C, 115°C, 24.32 at 40°C and 12.83°C at 100°C, 1.45, 5.89, 0.874 respectively. This indicate that the extra is a potential soap feed stock, the quantity of oil added per batch. The soaps were characterized for foam capacity, foam stability, Hardness and pH and compared with that produced for oil. pH values of 9.63 and 10.52 for PKO and RSO soap were obtained which is within the acceptable range.
MATERIALS

ALOE VERA

Figure.3. Aloe vera

BIOLOGICAL NAME : Aloe Barbadensis

TAXONOMICAL CLASSIFICATION:
KINGDOM : Plantae - plantus
SUPER DIVISION : Spermatophyte
DIVISION : Angiosperms
CLASS : Monocots
SUB CLASS : Rosidae
ORDER : Asparagus
FAMILY : Liliacaea
GENUS : Aloe
SPECIES : Barbadensis

USES OF ALOE VERA GEL:

1. IT TREATS SUN BURNS:
Aloe vera helps with sun burn through its powerful healing activity at the epithelial level of the skin. A layer of cells that cover the body. It acts as a protective layer on the skin and helps replenish its moisture. Because of its nutritional qualities and anti oxidant properties, the skin heals faster.

2. IT ACTS AS MOISTURIZER:
Aloe moisturizers the skin without giving it a greasy feel so its perfect for any one with any oily skin complexion.

3. IT TREATS ACNE:
Aloe vera gel contains two harmones : Auxin and Gibberellins. Tese two harmones provide wound healing and anti-inflammator properties that reduce skin inflammation. Gibberellin in aloe vera acts as a growth harmone stimulating the growth of new cells. It allows the skin to heal quickly and naturally with minimal scarring.

5. ITLESSENS THE VISIBILITY OF STRETCH MARKS:
The skin is like one big piece of elastic that ll expand and contract as needed to accommodate growth. But if the skin stretches too fast, the elasticity of the skin can be damaged. That’s what leaves those unsightly stretch marks.

TURMERIC

Figure.4. Curcuma longa

BIOLOGICAL NAME : Curcuma longa
SYNONYMS : Curcuma domestica
COMMON NAME : Turmeric root, Indian saffron
PLANT FAMILY : Zingiberaceae
ORDER : Zingiberaceae
GENUS : Curcuma
SPECIES: Curcuma longa.

IT CONTAINS PROPERTIES THAT CONTRIBUTE TO A NATURAL GLOW:
Turmeric contains antioxidants and anti-inflammatory components. These characteristics may provide glow and luster
to the skin. Turmeric may also revive your skin by bringing out its natural glow.

**It can heal wounds:**
The curcumin found in turmeric can help wounds heal by decreasing inflammation and oxidation. It also lowers the response of your body to cutaneous wounds. This results in your wounds healing more quickly.

**It can help your psoriasis:**
The antioxidant and anti-inflammatory qualities of turmeric may help your psoriasis by controlling flares and other symptoms.

**HONEY:**

**USES OF HONEY**
1. **Moisturizing face mask:**
   “With its moisturizing and soothing effects, raw honey can hydrate the skin, leaving it soft, radiant, and glowing.

2. **Scar fader:**
   Honey is a great wound healer.

3. **Acne spot treatment:**
   Honey in particular works well for this—it is an anti-inflammatory which can help reduce redness and swelling of pimples, says Engelman, and its antibacterial properties can help fight acne-causing bacteria. “Also, because honey keeps the skin well-hydrated and balanced, it helps control the production of oil.”

4. **Cuticle moisturizer:**
   Since honey is a natural humectant, Pekar says, it draws moisture into the skin keeping your cuticles happy and peel free.

**NEEM OIL**

**BIOLOGICAL NAME:** *Azadirachta indica*
**SYNONYM:** Neem
**COMMON NAME:** Neem, neem tree, Indian lilac
**PLANT FAMILY:** Meliaceae
**ORDER:** Sapindales
**GENUS:** Azadirachta

**SPECIES:** *Azadirachta indica*

**Benefits for the skin**
The use of neem oil in general skincare or as a treatment for skin conditions of the available research into medicinal uses of neem concluded that its extracts can help treat a variety of skin conditions, including:
Fighting skin infections
The antibacterial properties of cosmetic products containing neem compounds. The authors found that soaps containing extracts of neem leaf or neem bark prevented the growth of several strains of bacteria.

POTASSIUM HYDROXID

Figure 7. Potassium hydroxide

IUPAC NAME: Potassium hydroxide
OTHER NAMES: caustic potash, lye
CHEMICAL FORMULA: KOH
MOLECULAR WEIGHT: 56.11g/mol
APPEARANCE: white solid, deliquescent
ODOR: Odor less
MELTING POINT: 360˚C
BOILING POINT: 1327˚C
SOLUBILITY: soluble in water
USES OF POTASSIUM HYDROXIDE:

Manufacture of soft soaps: The saponification of fats with KOH is used to prepare the corresponding potassium soaps which are softer than the more common sodium hydroxide –derived soaps. Because of their softness and greater solubility, potassium soaps require less water to liquefy, and can thus contain more cleaning agent than liquefied sodium soaps.

SODIUM HYDROXIDE

Figure 8. Sodium hydroxide

IUPAC NAME: Sodium hydroxide
SYSTEMATIC IUPAC NAME: Sodium oxidanide
OTHER NAMES: caustic soda, lye, caustic
CHEMICAL FORMULA: NaOH
MOLECULAR WEIGHT: 39.997g/mol
APPEARANCE: White, waxy, opaque crystals.
ODOR: Odor less
MELTING POINT: 318˚C
BOILING POINT: 1,388˚C
SOLUBILITY: Soluble in glycerol negligible in ammonia, Insoluble in ether slowly soluble in propylene glycol.
USES OF SODIUM HYDROXIDE:

Sodium hydroxide was historically used in the formulation of soaps, but is currently seen in a variety of formulas, including bath products, cleansing products, fragrances, foot powders, hair dyes and colors, makeup, nail products, personal cleanliness products, shampoos, shaving products, depilatories, skin care products. etc aging and irritation.

COCONUT OIL

Figure 9. Cocos nucifera

BIOLOGICAL NAME: Cocos nucifera
KINGDOM: Plantae
ORDER: Arecales
FAMILY: Arecaceae
SUB- FAMILY: Arecoideae
GENUS: Cocos L.
SPECIES: Nucifera
USES OF COCONUT OIL:

Skin Conditions:
coconut oil is on a rise in popularity for treating skin conditions like eczema, psoriasis and other skin conditions.

Stretch Marks:
Using coconut oil can help reduce the stretch marks that are left behind, helping them fade more quickly while keeping skin moisturized to allow quicker healing.

Sunburn Relief:
Coconut oil can help soothe inflamed skin, reduce redness and rehydrate skin. Coconut oil contains a series of fatty acids that nourish and immunize your skin.

AIM AND OBJECTIVE
The aim of the present study is to formulate and evaluate poly herbal soap by cold process using natural bases and study the anti-bacterial activity. Herbal system with an improved patient compliance, better activity less side effects with less toxicity for treatment of anti bacterial agent.
The major objectives of the investigation are:
- Selection of herbal components
- Standardization of herbal components
- Preparation of soap base
- Preparation of poly herbal soap by cold process
- Evaluation of prepared formulation for physical parameters

Basis for herbal selection: From our tradition the herbal components are used as beautifying agents due to their tremendous activities in aging therapy.

PROCEDURE FOR SOAP:

COLD PROCESS: When using thermometer in this experiment never use it to stir liquids. Instead, use a fire polished glass rod. To properly measure the temperature of a liquid, whole the thermometer so that its bulb is suspended in the centre of the liquid while reading the mercury level. If the liquid is being heated on a hot plate, do not the thermometer bulb to rest on the bottom of the container, as it will then be over heated. Remove the thermometer from the container after each reading.

Weigh 150 ml beaker on the trip scale and add 8gm of NaOH pellets to it. Handle NaOH with care as NaOH can burn the skin and is especially harmful to the eyes. In the hood add 25ml of cold water to the beaker. Stir the mixture of NaOH pellets and water, until a clear solution results. Weigh 250ml beaker on the trip scale and add 58gm of fat to it. Then place the beaker on the hot plate with low heat and with occasional stirring, melt the fat to melt completely. Warm the melted fat to between 42-50˚C. remove the fat from hot plate and add the Lye solution to the fat with stirring. Stir the fat and NaOH mixture continuously and until an emulsion is formed. Your mixture should look like a thick, light yellow milk shake and should stay emulsified. If your emulsion separates, the fat is to hot and needs to cool. Let the mixture cool on the bench top with occasional stirring until an emulsion, which does not separates, is formed. You may want to add perfume or other additives at this point. Pour the emulsion into a plastic cup and place in your drawer for the reaction to run. Take the soap foam with you and let age for about 2 weeks. During this time a powdery layer of sodium carbonate will form on the surface, as residual NaOH reacts with CO₂ in the air while the soap is drying. This powdery layer should be sliced off and the soap is ready to be used.

HERBAL SOAP:

Table.3. Materials And Methods

<table>
<thead>
<tr>
<th>INGREDIENTS</th>
<th>QUANTITY</th>
<th>USE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coconut oil</td>
<td>75gm</td>
<td>Anti-Aging, Moisturizer</td>
</tr>
<tr>
<td>Sodium Hydroxide(pellets)</td>
<td>13.28gm</td>
<td>Lye</td>
</tr>
<tr>
<td>Distilled water</td>
<td>24.75gm</td>
<td>Aqueous vehicle</td>
</tr>
</tbody>
</table>

SOAP BASE FORMULATION:

Cold process method: For the preparing soap base, we take 75ml of coconut oil in a 500ml of beaker. put it on the water bath boil the liquid up to forming strong consistency under the temperature 40-45˚C with stirring. and note the temperature level by using thermometer. then we take NaOH or Lye was weighed into a clean beaker and add into the distilled water, again we maintain the temperature levels by using thermometer. add this solution to the coconut mixture, boil at 40-45˚C up to formation of base consistency. Then the mixture can be transfer into soap moulds and keep it the freezer upto 2-3 hours and then after 2-3 hours remove the soap containing moulds from the freezer then allow to 5 mints without disturbance then soap will be formed.

Table.2. Each 75gm of poly herbal soap contains:

<table>
<thead>
<tr>
<th>INGREDIENTS</th>
<th>QUANTITY</th>
<th>USE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soap base</td>
<td>75gm</td>
<td></td>
</tr>
<tr>
<td>Aloe vera gel</td>
<td>2gm</td>
<td>Anti-aging</td>
</tr>
<tr>
<td>Neem oil</td>
<td>2gm</td>
<td>Antibacterial</td>
</tr>
<tr>
<td>Honey</td>
<td>1gm</td>
<td>Anti-aging, antibacterial</td>
</tr>
<tr>
<td>Turmeric</td>
<td>0.5gm</td>
<td>Antibacterial</td>
</tr>
<tr>
<td>Rose oil</td>
<td>5 drops</td>
<td>Flavouring agent</td>
</tr>
</tbody>
</table>

Poly Herbal Soap Formulation: To prepare soap we take the required quantity of soap base in a 500ml of beaker and maintain the temperature at 45˚C to heat the soap base on the water bath without stirring. Then the soap base will be converts into liquid form. and then add the all ingredients to the above mixture. Boil the mixture 45˚C on the water bath to obtain proper mixture without stirring. Then the mixture poured into the soap moulds and freeze the soap containing moulds up to 2-3 hours. after 2-3 hours remove the soap moulds from the freeze allow to 5 minutes then soap will be formed.
EVALUATION OF PHYSICOCHEMICAL PARAMETERS OF THE PREPARED FORMULATIONS:

Various physicochemical parameters which are mentioned below were performed to establish quality of the prepared formulation while comparing to marketed soap formulation.

**Physical parameters:**
Clarity and color was checked by naked eyes against white background, the odor was smelled.

**pH:**
The pH of all the prepared formulations was determined by using digital pH meter. The formulations were dissolved in 100 ml of distilled water and stored for two hours. The measurement of pH of formulation was done in previously calibrated pH meter.

**Accelerated stability testing:**
Accelerated stability testing of prepared PHF was at room temperature, studied for one week at 50 °C ± 1°C for 3 months. The PHF were kept both at room and elevated temperature and observed on 0th  15th, 20th, 30th, 40th, 50th, 60th, 70th, 80th and 90th day for the following parameters.

**Determination of percentage free alkali:**
About 5 grams of sample was taken in a conical flask and added to it into 50ml of neutralized alcohol. It was boiled under reflux on water bath for 30 minutes, cooled and 1ml of phenaphthalein solution was added it was then titrated immediately with 0.1N HCL.

**Foam Height:**
0.5 grams of sample of soap was taken dispersed in 25 ml distilled water. then, transferred it in to 100ml measuring cylinder; volume was make up to 50 ml with water. 25 strokes were given and stand till aqueous volume measured up to 50 ml and measured the foam height, above the aqueous volume.

**Foam Retention:**
25 ml of the 1% soap solution was taken in to a 100 ml graduated measuring cylinder. The cylinder was covered with hand and shaken 10 times. The volume of foam at 1 minute intervals for 4 minutes was recorded.

**Alcohol Insoluble Matter:**
5gm of sample was taken in a conical flask. Added it to 50 ml of warm ethanol and shaken vigorously to dissolve the solution was filtered through a tarred filter paper with 20 mi warm ethanol and dried it at 105 °C for one hour. The weight of dried paper was taken.

**Formula:**
Percentage alcohol insoluble matter = Weight of the residue×100 /Weight of sample

**ANTIOXIDANT ACTIVITY OF POLY-HERBAL FORMULATION**

**INTRODUCTION:**
Anti-oxidants are substances capable to end up free radicals and prevent them from causing cell damage. Antioxidants cause protective effect by neutralizing free radicals, which are toxic byproducts of natural cell metabolism. Fruits and vegetables are loaded with key antioxidants such as vitamin A, C, E, beta-carotene and important minerals, including selenium and zinc. Herbs also serve as antioxidants. Phytoconstituents are also important source of antioxidant and capable to stop the free radical chain reactions.

**II. RESULTS AND DISCUSSION:**

**Preparation and evaluation of physicochemical parameters**
The physicochemical parameters of the prepared soap were determined. Parameters such as color, odour, appearance, pH were tested. The formulations exhibited good as appearance characteristic as well as the pH was found in the range 7.0 which is the desired pH. Other parameters such as percentage Free alkali, Foam height, Foam retention, Alcohol insoluble matter, and high temperature stability were determined; The results are tabulated.
Table 3. Physico chemical parameters of formulation

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Chemical parameters</th>
<th>Herbal soap</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PH</td>
<td>7.3</td>
<td>6.5-7.5</td>
</tr>
<tr>
<td>2</td>
<td>% free alkalie</td>
<td>0.27</td>
<td>0.25</td>
</tr>
<tr>
<td>3</td>
<td>Foam height(cm)</td>
<td>2.5cm</td>
<td>2.5-3.0</td>
</tr>
<tr>
<td>4</td>
<td>Foam Retention(min)</td>
<td>2cm</td>
<td>0.5-2.5</td>
</tr>
<tr>
<td>5</td>
<td>Alcohol insoluble matter</td>
<td>18.0</td>
<td>18.0</td>
</tr>
<tr>
<td>6</td>
<td>High temperature stability</td>
<td>Soap melts above 45°C</td>
<td>45°C</td>
</tr>
</tbody>
</table>

Table 4. Biological parameters:

Anti oxidant activity phosphomolybdenum free radical scavenging activity of a selected are listed in the following table:

<table>
<thead>
<tr>
<th>S.No</th>
<th>Concentration</th>
<th>Sample Absorbance</th>
<th>Standard Absorbance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.1</td>
<td>0.429</td>
<td>0.251</td>
</tr>
<tr>
<td>2</td>
<td>0.2</td>
<td>0.634</td>
<td>0.091</td>
</tr>
<tr>
<td>3</td>
<td>0.3</td>
<td>0.643</td>
<td>0.086</td>
</tr>
<tr>
<td>4</td>
<td>0.4</td>
<td>0.881</td>
<td>0.078</td>
</tr>
<tr>
<td>5</td>
<td>0.5</td>
<td>0.908</td>
<td>0.078</td>
</tr>
</tbody>
</table>

III. SUMMARY AND CONCLUSION

- Ploy herbal soap were prepared by using cold process technique and were found to be without particles transparent components which are used in formulation are having good compatibility without any significant changes.
- The prepared formulation showing good physical characteristic.
- On the basis of evaluation studies the formulation provide excellent foaming property, free from alkali components.
- The microbiological study results gives the formulation having antimicrobial property by conducting antioxidant studies the soap formulation having good anti-aging property compare to marketed formulation.
- Based on the study research it can be concluded that poly herbal can be effectively formulated as in the form of soap by using cold process technique which having excellent anti-aging property.

IV. REFERENCE


[6]. Sahu RK, Roy A, Matlam M, Deshmukh VK, Dwivedi J, Jha AK. Review on skin aging and compilation of scientific validated medicinal plants, Prominence to flourish a better research reconnoiters in herbal cosmetic.


