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## **Research On Formulation and Evaluation of Poly-Herbal Soap With Anti-Bacterial Activity**

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### **ABSTRACT**

The ultimate aim of present work was to prepare formulation of poly-herbal soap from extract of tulsi leaves, aloe-vera leaves, vitamin E capsules and honey using glycerine soap base by melt and pour method. The formulation was evaluated for physicochemical parameters like appearance, pH, sensitivity test, foaming test, stability test. All evaluation parameters results were positive and comply with standard values. Therefore, these plant materials can be used in the preparation of herbal soap on commercial scale for acne treatment.

**Keywords:** Polyherbal Soap, plant material, acne.

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Received 21 February 2023, Accepted 28 March 2023

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Please cite this article as: Maske DM *et al.*, Research On Formulation and Evaluation of Poly-Herbal Soap With Anti-Bacterial Activity. American Journal of Pharmacy & Health Research 2023.

## INTRODUCTION

Skin is the most revealed part of the body which is prone to various foreign from various disorders there is a need for the proper cleanliness as well hygiene particles which may lead to various skin related disorders. Therefore, in order to prevent skin for the most exposed part of the body and prevent it from the pervasive micro-organism spread in the environment thus, preventing various disorders of the skin. The enhanced and effective way to remove all the foreign particles, dirt is the use of Soaps. The utilization of soap helps in cleaning the skin along with the anti-microbial properties.<sup>1</sup>

Skin diseases are among the major public health problems as they have a considerable impact on individual and communities. They cause pain, suffering, and impairment of normal functions. The frequency of these skin diseases is on an increase as a result of the increasing unsafe synthetic chemicals compounded into the skin care products.<sup>2</sup>

Skin infectious to the fungi are the most common and require significant attention for treatment, and also to maintain a healthy skin thereafter. The most common skin problem are: Acne scars, Eczema, Hives, Skin rashes, Dry and Cracked skin, Psoriasis, Stretch marks, Sun damage, Skin dullness and lack of elasticity.<sup>3</sup>

In general, bacteria live in the dead and top layer of the skin cells of moist areas of the body and causes acne. Propioni bacterium acnes (*P. acnes*) is the bacteria that live on the skin and contributes to the infection of pimples. *P. acne* is tiny microbe that lives in the oily region of the skin's pores. The bacteria can aggravate an immune response which causes red, swollen bumps to grow on the skin (acne). Acne is a condition affecting skin's hair follicles and oil glands. Under the skin pores are connected to glands that make an oily substance known as sebum. Acne occurs when the opening of hair follicles become clogged and blocked with oil secretions and dead skin cells. If the clogged pore becomes infected with bacteria, inflammation results. A hair follicle is a part of the skin, which grows a hair by packing old cells together. Attached inside the top of the follicle are sebaceous glands, which are tiny sebum producing glands almost in all skin except on the palms, lips and soles of the feet. It often causes whiteheads, blackheads or pimples and typically appears on the face, forehead, chest, upper back and shoulders.<sup>4</sup> The severity and occurrence of acne hinge on the strain of bacteria. Not all acne bacteria cause pimples.

Acne can be treated in many ways but natural method to treat acne is found to be more safe as it has less side effects. Herbal soap can be formulated by making use of natural substances like aloe vera, neem, honey, tulsi, vitamin supplements, calendula, cinnamon powder, tea tree oil, hibiscus leaves etc.<sup>5</sup>

Aloe vera gel is a natural anti-bacterial substance which kills the acne causing bacteria and help lessen the associated redness. Aloe vera gel contains significant dose of magnesium lactate. Magnesium lactate is able to take the sting away from painful acne pimples. Aloe vera hydrates the face without causing shine or overproduction of oils, which can clog pores. Due to its proven anti-inflammatory and antimicrobial properties, it is effective way to combat both the redness and size of the cyst. Aloe vera gel has some side effects which causes skin allergies, redness in the eyes, skin rashes, irritation and burning sensation. But this can be overcome by using honey and glycerin in the formulation.<sup>6</sup>

Honey won't work on all acne, but it may work on inflamed pimples. Raw honey works to make inflammatory acne look less angry because it has an osmotic effect on the skin so it can draw out excess fluid and help to reduce inflammation. Honey also act as emollient and produces soothing effect and moisturizes skin.

Tulsi being astringent in nature, tulsi benefits skin by soaking up the extra oil and moisture and drying up the prevailing acne. It controls the acne as it has antimicrobial and anti-inflammatory properties. It reduces pain and redness around acne. Tulsi can be used to treat acne and scars, skin infections, lighten dark spots, and improve skin texture. The antifungal, anti-inflammatory and anti-bacterial properties of tulsi helps purify the blood and remove toxins and bacteria from the skin. The herb is super-rich in antioxidants, which give it the ability to rejuvenate the skin. It also reduces pain and redness around acne. This wonder herb has proved itself to be one of the most essential ingredients used in herbal skin care products. The plants leaves can help to eliminate acne causing bacteria. Moreover, they leave scars and marks, even when they are treated. Therefore, a plant like Tulsi is good to cure face pimples, marks, skin diseases and allergies. Furthermore, it need to avoid certain things that create trouble for skin like excessive exposure in the sun, pollution over usage of chemical based products. All these issues can lead to dull and lifeless looking skin and face. Tulsi is also one of those Ayurvedic herbs, known for skin whitening benefits, pigmentation removal, and to get young glowing skin.<sup>7</sup>

When it comes to treat acne, vitamin E seems to work best topically. Vitamin E oil is absorbed into the skin quickly because it is fat soluble. This leads to faster healing of acne and acne scars. It controls the production of collagen and elastin in the skin. It can reduce skin wrinkles and dryness as well. Vitamin E is just one of the anti-oxidants touted as a probable acne treatment. Nutritionally speaking, vitamin E is an anti-inflammatory, which means it can help with cell regeneration. These properties specifically helps with inflammatory acne, such as nodules.<sup>8</sup>

Perfume (fragrance) is a mixture of essential oils or aroma compounds, used to give a pleasant scent. Fragrances are used in a products to impart a pleasant odor, mask the inherent smell of some ingredients, and the experience of using product. Perfumes and colognes are usually alcohol based and alcohol can be complicated in soap. So very less quantity of perfume should be used in soap formulation.<sup>9</sup>

Herbal soaps can be defined as fatty acids in combination with alkali salts being resulting from vegetable or plant origin containing natural fragrances or organic ingredients. The quality of soaps are dependent on various factors such as type of alkali used, its hardness, foam height, solubility etc.

Herbal medicinal products are in greater demand than synthetic ones because of many reasons:

- Lesser Side effects
- Better safety and efficacy
- Easily Available
- Better compatibility with additives
- Potent therapeutic effects
- Cost-friendly
- No requirements of animal testing
- Better compatibility with all types of skin

Herb soaps are made using natural herbs and ingredients that are healthier and beneficial for the skin and are less likely to cause any damaging effect. Some of the natural soap manufacturers also use aroma therapy and herbal treatments to offer the finest skin treatment solution for your skin.<sup>10</sup>

Herbal products in cosmetics can also be referred as botanical origin products in cosmetics. Soap is substance used for washing and cleaning, consisting of a mixture of sodium or potassium salts of fatty acids. Like detergents, soaps work by surrounding particles of grease or dirt with their molecules, thereby allowing them to carry away. The basic method of soap making is known as saponification. In recent years, the plant based natural products have become an attractive alternative to enhance important biological characteristics of medicinal soaps<sup>11</sup>.

Ultimately, the herbal soap lead to premature aging of skin at a young age. The importance of an herbal soap is that, they are made from the extracts of herbal plants and essential oils, which makes them safe to use for people of any age. It gently cleanses your skin without causing any harm to the skin's oil balance.

Production of natural as well as handmade soaps have been a total artistry work involving various factors such as skill, ingredients, creativity and thoughts tend to produce a quality soap.

Factors affecting the quality of soap are:

- Ability of lather producing
- Color of the soap
- Fragrance of the soap
- Moisturizing ability
- Compatibility of the skin
- Storage Stability

There is no need to add preservatives in herbal soap formulations made by cold process or Melt and Pour method. Both Cold process and Melt & Pour soaps have a pH level that does not allow mold or bacterial growth in the soaps.<sup>12</sup>

There are basically four different types of methods that are used to make soap are:

- Melt and Pour Method
- Cold Process Soap
- Hot Process Soap
- Saponification

Soap bases are used to incorporate all medicinal herbal ingredients into it. Glycerin soap base is clear, white. This soap is most often used in melt and pour soap than in other kind of soap.

Lard is another soap base which produces thick creamy lather and has conditioning properties.<sup>13</sup>

### **Collection of Materials/ Ingredients**

Tulsi Powder, Aloe vera gel, Honey, vitamin E oil capsules were purchased from local market. Glycerin soap base was obtained from amazon app. The following table (Table 1) represents the list of ingredients used for the formulation of Poly-herbal Soap.<sup>14</sup>

#### **Tulsi Powder:**

- Tulsi is also known as Basil sweet/ *Ocimum basilicum*.
- Basil sweet is a fresh herb as well as essential oil of *Ocimum basilicum* Linn. It is found in India. (All about basil sweet oil, New Directions Aromatics, October 24, 2018)
- Sweet basil contains proteins, vitamin A and C.
- Uses: Tulsi treats skin issues, eliminates pimples and acne. Prevents Inflammation and tighten up skin pores. Gives glowing skin.

#### **Aloe vera Gel:**

Aloe vera gel is obtained after eliminating the outer most tissue of the leaf of Aloe barbadensis (liliacea) found in South Africa, West India and India.

**Uses:**

Aloe vera is act as anti-inflammatory and gives cooling effect to skin. It is used in sunburn skin. It provides a protective layer to the skin which helps retain moisture. Aloe is also rich in anti-oxidants and minerals which can help speed healing.



**Figure 1: Aloe vera**

**Vitamin E Oil:**

Vitamin E is a nutrient that body needs to support immune system and helps cell to regenerate. Vitamin E is best known for its anti-oxidant properties that help reduce UV damage in skin. Vitamin E also helps to nourish and protect skin from damage caused by free radicals.

Uses: Vitamin E oil is used as anti-oxidant for skin.



**Figure 2: Vit E Capsules**

**Honey:**

Honey or Apismelifera is a saccharine secretion deposited in the cells of honeycomb by the hive bee. Apismelifera (Apidae) and other species of Apis.

Purified honey BP is prepared from the crude honey, by melting it at moderate temperature, skimming of any impurities by decantation and diluting with water to a weight of 1.35-1.36gm/ml at 20 degree C. Honey when freshly prepared is a clear, syrup liquid of pale yellow or

reddish-brown color. On keeping it crystallizes and becomes opaque in appearance. It contains anti-oxidants, anti-bacterial and antiseptic properties

**Uses:**

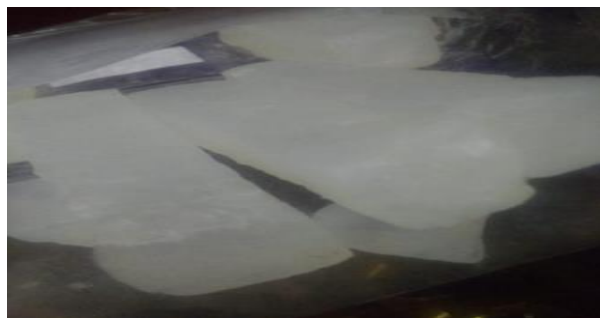
Honey helps to get rid of blackheads. It is used as humectant by producing moisture and soothing effect. It is also used in acne by keeping pores free of oil dirt and keep them hydrate and tight that gives clear complexion.



**Figure 3: Honey**

**Glycerin Soap Base:**

Glycerin is a by-product of soap production. Glycerin soap is natural by-product of saponification with added ingredient due to moisturizing property. During the soap manufacture process, the fats/oils and lye blend together to form soap while, the natural glycerin maintains its integrity as glycerin and basically settles in between the soap molecules. Glycerin soap base is most often used in melt and pour method in formulation of soap product. Perfume like orange peel oil is used as fragrance in very small quantity in herbal soap formulation to mask unpleasant odor of herbs and produce good aroma to enhance its smell.



**Figure 4: Glycerin Soap Base**

**Method of Preparation:**

Herbal soaps can be formulated basically by four methods. That processes involves Cold Process, Melt and Pour method, hot process and Saponification. The poly-herbal soap were formulated by Melt and Pour Method.<sup>15</sup> In this method Glycerin soap base were used. The procedure for making herbal soap is as given below:

1. Wash all apparatus neatly and dry it.
2. Weigh accurately all the ingredients on digital weighing balance.
3. Place the 45gm of glycerin soap base in china dish and keep it in water bath and heat it with occasional stirring until it get melt.
4. Then add 5gm of tulsi powder, 15gm of aloe vera gel and 7.8ml of honey in melted glycerin base.
5. Add about 3.2ml of vitamin E oil and few drops of perfume in above mixture and stir it until all ingredients are well mixed in glycerin base.
6. Then pour the mixture uniformly in molds and allow to set. (Silicon mold is used)
7. After that cool the poured mixture at room temperature fist and then keep it in refrigerator for 30minutes.
8. Remove the solid matter that is soap from mold gently.

**Table 1: Formulation of Herbal Soap**

Sr. No.	Ingredients	Quantity
1	Tulsi Powder	5gm
2	Aloe-Vera	15gm
3	Vitamin E capsules	3.2ml
4	Honey	7.8gm
5	Glycerin Soap Base	45gm
6	Rose Water	0.5ml

**Table 2: Formulation Ingredients of Poly-herbal Soap**

Sr. No.	Ingredients	Quantity
1	Tulsi Powder	5gm
2	Aloe-Vera	15gm
3	Vitamin E capsules	3.2ml
4	Honey	7.8gm
5	Glycerin Soap Base	45gm
6	Rose Water	0.5ml

## EVALUATION:

Evaluation of Physicochemical Parameters of Prepared Formulation:

### pH of Poly-herbal Soap:

pH of the prepared soap was determined by using pH paper or digital pH meter. pH of the soap was determined by just placing the pH paper strip to freshly prepared soap and recording the color appears on strip by comparing with standard pH scale. 10% of soap solution was prepared by dissolving 10 gm of soap in distilled water in a volumetric flask of 100 ml. For the determination of pH, pH meter was used. Electrode was introduced into the solution and the pH was noted down.<sup>16</sup>

**Color and Clarity Characterization:**

The soap was visualized against the white background for the determination of its color and to see clarity of formulated Poly-herbal soap.<sup>17</sup>

**Primary Skin Irritation / Sensitivity Test:**

Skin reaction can be unpredictable, checking the skin's tolerance to a brand new item is necessary to identify potential allergic reactions. This is usually done before using any homemade soap for the very first time, whether it is store bought or homemade. It is effortless to test your skin for a reaction before regular application by using a small bar of soap in a discreet and small area. When trying new homemade soap, people with sensitive skin and people who tend to break out easily need to be more careful. Still, since everyone skin is unique, and since tolerability differs meaningfully in between individual, a skin patch test is extremely recommended, no matter the skin type, to avoid possible skin reactions.<sup>18</sup> Lather up your handcrafted soap and try inside of your elbow or under your chin. Remove the patch instantly if you notice any signs of allergy such as rash, itching, redness, swelling or burning feelings. If his occurs, wash the affected skin area with warm water, without scrubbing to prevent more inflammation. No reaction means that it should be acceptable to use the handmade soap. Discontinue use if a reaction occurs upon secondary applications.<sup>19</sup>

**Foam Forming Ability:**

For the determination of the Poly-herbal soap for its ability to form foam about 1.0 gm of soap was taken and dissolved in distilled water (about 50 ml) in a graduated measuring cylinder. The measuring cylinder was then shaken for about 2-3 minutes and it was allowed to stand for about 10 minutes.<sup>20</sup> Record the observation for three consecutive experiments and the mean was taken

**Retention Time of Foam:**

Foam retention time

**Table 3: Results of Various Evaluating Parameters**

Sr. No.	Evaluation Parameters	Readings
1	pH	7.8
2	Color and Clarity	Penny Brown
3	Skin Irritability	No skin irritation
4	Foam forming ability	16.5
5	Foam retention time	5min.
6	Moisture Content	3.5%
7	Antimicrobial Testing	Shows good antimicrobial activity compared with standard
8	Determination Of TFM	72%

**CONCLUSION**

The evaluation parameters carried out for standardizing the herbal soap by color determination, pH, Foam Retention time, Foam forming ability, sensitivity test. This led to an outcome of the formulation of stable Poly-herbal soap. In addition this formulation was found to be used for daily use and did not cause any skin irritation.

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