

**IN VITRO FORMULATION AND SELECTED CHARACTERIZATION OF BODY SOAP  
INFUSED WITH INDIGENOUS PLANT EXTRACT**Ekhschit Bharat<sup>1</sup>, Jashvinder Singh<sup>2</sup> and Anil Sao<sup>3\*</sup><sup>1,2</sup>Researcher, Mata Gujri College of Pharmacy, Kishanganj, Bihar-855107.<sup>3\*</sup>Associate Professor, Department of Pharmaceutical Chemistry, Mata Gujri College of Pharmacy, Kishanganj, Bihar-855107.**\*Corresponding Author: Anil Sao**

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**ABSTRACT**

**Aim & Objective:** Numerous chemical toxins and microorganism present in the atmosphere may cause inflammation and damage to skin, while synthetic cosmetics alone are not sufficient to take care of skin and body parts. **Methodology:** This investigation is to formulate and assess at laboratory scale a unique polyherbal natural skincare soap incorporated with tulsi, neem, aloe vera and coconut oil that promises to leverage the therapeutic benefits of herbs to provide effective moisturization, nourishment, and overall skin health. The formulated herbal soap was evaluated for the analysis of pH, Moisture content, foaming index, foam retention time, saponification comparing with standard. Results: The results demonstrated that pH, moisture content, foaming index, foam retention time, Saponification value were in acceptable range when compared with the standard. **Conclusion:** Thus this document explores the future prospects of herbal cosmetics, with a focus on herbal soaps.

**KEYWORDS:** Polyherbal Soap, Evaluation, Saponification value, Antimicrobial potential.**1. INTRODUCTION**

Herbal cosmetics are beauty products formulated primarily with plant derived ingredients, such as herbs, botanical extracts, essential oils, and natural substances. Unlike conventional cosmetics that contain synthetic chemicals, herbal cosmetics harness the power of nature to nourish and enhance the skin, offering a holistic approach to skincare. These products have gained popularity due to their perceived safety, efficacy, and minimal environmental impact.<sup>[1]</sup> Herbal cosmetics are infused with natural emollients and humectants that help to replenish moisture, keeping the skin soft, supple, and well-hydrated along with these they emphasize anti-inflammatory and healing properties.<sup>[2]</sup>

Soaps are a popular category of cosmetics for daily useful purpose of cleaning dirt and sweat from the skin. Within the realm of herbal soaps crafted using natural ingredients like herbs, botanical extracts, and essential oils, offers a gentle yet effective cleansing experience. The commercial soaps that contain harsh detergents and synthetic fragrances on contrary herbal soaps prioritize purity and natural goodness.<sup>[3]</sup> Ingredients like Neem, Tulsi, aloe vera, and coconut oil are common in herbal moisturizers and creams helps to build trust with consumers who prioritize natural and organic skincare. Thus, herbal medicinal cosmetics imparts various

required properties that otherwise may require various pharmaceutical formulations such as soaps, ointments, gels, creams for the treatment of various skin related disorders. While this project work will reestablish the benefits of herbal ingredients and providing informative content to its reader community and prove to be holistic and can cater to individuals seeking gentle, effective, and environmentally conscious beauty solutions.<sup>[4]</sup>

**2. AIM AND OBJECTIVE**

The project was set with goal to develop a herbal body soap which can best suit for natural skincare that leverages the therapeutic benefits of herbs to provide effective moisturization, nourishment, and overall skin health improvement. The Objectives directly rely firstly was to select suitable herbs and botanical extracts optimal combination and concentration efficient for skin care and secondly was to evaluate the physicochemical properties of the formulated soap, including pH, hardness, and foaming ability and ensure the safety and stability of the herbal soap formulation through standardized testing procedures.

**3. MATERIAL AND METHOD****3.1 Neem**

Neem scientifically known as *Azadirachta Indica* often referred to as "the village pharmacy," is a tree indigenous

to the Indian subcontinent and has been used for numerous therapeutic properties like antibacterial, antifungal, antiviral, and anti-inflammatory effects since ages in traditional medicine.<sup>[5]</sup> The variety of pharmacological properties like antibacterial, antifungal, antioxidant and antidiabetic are exhibited by phytoconstituents like azadirachtin, nimbin, nimbidin and quercetin.<sup>[6]</sup>

The concentrated neem extract was obtained cold extraction process to preserve the co-therapeutic properties of bioactive compounds. The fresh green leaves were collected from local plantation of residential area in Kishanganj district of Bihar state, India. The leaves were immediately washed and air-dried under shade for 14 days. The shade dried leaves were macerated for 48 hours and the extract obtained was concentrated by mild heat.



**Figure 1: Neem leaves.**

### 3.2 Tulsi

It is a Holy Basil and "A Herb for All Purposes" a sacred plant scientifically known as *Ocimum sanctum*. The medicinal use of this plant appeared since Atharvaveda and researchers have attempted to dugout its phytoconstituents from its roots, leaves, and seeds which are documented to have multi potential therapeutic properties.<sup>[7]</sup> The major bioactive constituents are Eugenol, Eucalptol, Methyl eugenol Flavonoids and

Tannins which renders to its antioxidant, antimicrobial and anti-inflammatory Pharmacological properties.<sup>[8]</sup>

The concentrated tulsi extract was obtained cold extraction process using fresh leaves. The fresh leaves were washed and air-dried under shade and carried out maceration for 48 hours, the extract obtained was concentrated by mild heat.



**Figure 2: Tulsi leaves.**

### 3.3 Aloe vera

Aloe vera, is a succulent plant species having scientific name as *Aloe barbadensis*, belongs to the family Asphodelaceae utilized widely for its moisturizing and smoothening properties across various cultures.<sup>[9]</sup> Its gel-like substance found in the leaves contains numerous bioactive compounds such as polysaccharides, glycoprotein's, enzymes, vitamins A, C, and E, minerals

and amino acids contribute to its therapeutic properties like reduce inflammation, antioxidant, wound healing, moisturizing and soothing effect.<sup>[10]</sup>

Aloe Vera extract was obtained by peeling off the leaves and scooping out the gelly matter followed by filtration and centrifugation.



Figure 3: Aloe vera.

### 3.4 Coconut oil

The oil obtained from the drupes kernel or meat of mature coconuts fruit having scientific name as *Cocos nucifera*, belonging to Arecaceae family is renowned for its versatile applications in various industries, including skincare.<sup>[11]</sup> Major Constituents present are saturated fatty acids, including lauric acid (around 45-50%), which

contribute to its strong antimicrobial activity against bacteria, viruses, and fungi while it also possesses moisturizing, emollient and skin softening property.<sup>[12]</sup> The coconut oil to be used in this project formulation was procured of high quality from local market of Kishanganj city of Bihar state.



Figure 4: Coconut oil.

## 4. Formulation

### 4.1 Table 2: Formulation table

Table 01: Formulation table for herbal soap.

Sr. no.	Ingredients	Quantity	Use	Source
1	Neem extract	10gm	Antibacterial	Leaves Extract
2	Tulsi extract	10gm	Antimicrobial	Leaves Extract
3	Aloevera extract	5gm	Soothing	Leaves Extract
4	Coconut oil	30ml	Moisturization	Local Market Purchase
5	Peppermint oil	Qs	Perfume	Local Market Purchase
6	Sodium Hydroxide	10.5gm	Saponification	Laboratory Reagent
7	Stearic acid	2gm	Hardening	Laboratory Reagent
8	Soft paraffin	1gm	Hardening	Laboratory Reagent
9	Sodium Lauryl Sulphate	1gm	Foaming agent	Laboratory Reagent
10	Ethanol	36ml	Solvent	Local Market Purchase

### 4.2 Procedure

The coconut oil was heated around 45 – to 50 °C to allow it to mix easily with other ingredients. In another container sodium hydroxide, sodium lauryl sulphate and Stearic acid solution was made by pouring water heated to similar temperature similar to oil phase. This mixture was added to coconut oil solution while heated and mixed thoroughly. Soft soap and neem, tulsi, Aloevera

extract and peppermint oil was added while cooling and allowed to solidify at normal temperature later refrigerated in suitable previously greased mould. After 24 hours the soap got solidified was removed from the mold and was placed in a cool, dry place to enhance the hardness and mildness of the soap, ensuring a better quality product.

## 5. Evaluation of physicochemical parameters

The evaluation of the herbal soap was carried out according to the standard protocols, and evaluated for various parameters including organoleptic characteristics, size and shape determination, thickness determination, weight determination, foam height, pH measurement, foam retention, high temperature stability test and saponification value.

### 5.1 Organoleptic evaluations

The herbal soap was observed thoroughly by selected observers and evaluated for its appearance, colour and odour, and was assessed visually by naked eyes.<sup>[13]</sup>

### 5.2 Size and Shape determination

The soap dimensions as height and width was measured using a measuring scale. The shape of soap was chosen as flat and square which is ideal in regular usage to apply on the body parts.<sup>[14]</sup>

### 5.3 Weight determination

The weight was determined by using a Digital weighing balance.<sup>[15]</sup>

### 5.4 Foam height

0.5gm of the sample of soap was taken and dispersed in 50ml of distilled water in a 100 ml measuring cylinder. 25 strokes were given to generate foam and stand till aqueous volume was measured up to 50 ml and measured the foam height, above the aqueous volume.<sup>[16]</sup>

### 5.5 pH measurement

A sample of the herbal soap was diluted with distilled water in a 1:10 ratio and average of three readings of the pH was recorded using a pre calibrated digital pH meter.<sup>[17]</sup>

### 5.6 Foam retention time test

Foam retention time refers to the time for which the foam produced by the soap retains. A formulated soaps 25 ml of 1% solution was made into the 100 ml measuring cylinder. Then the cylinder was shaken 10 times. The volume of foam was recorded at one minute for 4 to 5 minutes.<sup>[18]</sup>

### 5.7 Saponification value determination

Saponification value is the amount of Potassium Hydroxide required in milligrams for the complete saponification of fat or oil of 1 gm. For the determination of saponification value about 2 gm of the soap sample was taken in a conical flask and 0.5M KOH solution was added to it. This mixture was heated to about 55 OC with stirring continuously on a hot water bath. Then the temperature was further increased 100 OC and boiling was continued for about 1 hour. Titration was performed using standardized 05M Hydrochloric Acid and phenolphthalein as indicator. The end point observed as pink color disappearance. The step was followed similarly and a blank reading was obtained. By

substituting the values in given below formula saponification was determined.<sup>[19]</sup>

$$\text{Saponification value} = \frac{(b - a) \times 28.05}{w} \quad (1)$$

**Where: a – Burette reading for sample soap solution.**

**b - Burette reading for Blank solution.**

**w - Weight of oil in soap**

### 5.8 Determination of moisture content

Determination of moisture content is to determine the amount of moisture is present in the soap sample. Lesser the moisture content more is the stability of the formulation. Weigh a tarred china dish which is free from moisture and completely dry. About 5g of soap sample was taken in the china dish, then heated form about 2 hour at a temperature of 101°C. The weight before and after was heating was noted. Moisture content was analyzed as<sup>[20]</sup>

$$\% \text{ Moisture Content} = \frac{\text{Difference i weight} \times 100}{\text{Initial weight}} \quad (2)$$

### 5.9 Determination of percent total fatty matter

The procedure for the analysis of total fatty matter present in the soap sample is carried out by the reaction of the soap with an acid in association of hot water. In this procedure approximately 10g of the soap sample was taken and dissolved in 150 ml of distil water. This soap solution was further treated with 20% sulphuric acid and heated till the solution gets cleared. Fatty acids would be observed at the surface or the film which were then solidified by the addition of 7g of bees wax and again heated. Cake formation takes place and it was removed and weighed.<sup>[21]</sup>

$$\% \text{ Total Fatty Matter} = (A - X) / W \times 100 \quad (3)$$

Where, X - weight of wax

A- weight of wax + oil

W- weight of soap

## 6. RESULTS AND DISCUSSION

### 6.1 Organoleptic characteristics

The appearance of the soap was observed as suitable hard soap which can be mould with delicate pressure. The colour was observed as red colour against the white background, and having mild peppermint like odour evaluated by selected observer.

### 6.2 Size and Shape determination

The prepared herbal soap has a height of 8 cm, with width of 4 cm, which is square-shaped. This prepared soap size is ideal in regular usage to apply on the affected skin parts of the body. The thickness of the prepared soap was determined with the help of a ruler scale.

### 6.3 Weight determination

The weight was determined by using a Digital weighing balance and it was found to be 41.45gm.

#### 6.4 Foam height

0.5gm of the sample of soap was taken and dispersed in 25 ml of distilled water. Then, transferred it into 100 ml measuring cylinder; the volume was made up to 50 ml with water. 25 strokes were given and stand till aqueous volume was measured up to 50 ml and measured the foam height, above the aqueous volume. The observed foam height was found to be 2.8 cm.

#### 6.5 pH Test

The pH test was performed for prepared formulations using digital pH meter. The pH was observed to be 13.43 calculated by average of two readings. The measurement of pH of all the formulations was done in the previously calibrated pH meter.

#### 6.6 Foam retention time

Prepared the 25 ml of the 1% soap solution and transferred it into the 100 ml measuring cylinder. Then the cylinder was shaken 10 times. The volume of foam was recorded as 4.5 minutes.

#### 6.10 Table 2: Result outcomes

Table 2: Result Table.

Sr. No.	Parameters	Observation
1	Appearance	Solid, Smooth
2	Size	8 cm x 4 cm
3	Colour	Red
4	Odour	Pippement like odour
5	Shape	Rectangular flat with curved edges
6	Weight	41.45g
7	Foam Height	2.8 cm
8	pH value	13.43
9	Saponification Value	56.66
10	Foam Retention Time	4.5 minutes
11	Moisture content	5.5 %
12	Percent Total Fatty Matter	69 %

### 7. CONCLUSION

The evaluation of formulated herbal soap was performed successfully and tabulated in table no.2. The physicochemical parameters for herbal soap formulations were assessed thoroughly and found that color of the soap was red, appearance was found to be solid, having aromatic odor of Pippement oil like and the pH value determined was found to be 13.43. Other parameter like foam height was found to be 3.4cm and foam retention time was found to be around 4.5minute. All the evaluation tests performed showed good results, the prepared soaps produced good lather i.e. 2.7-2.9 cm and retained on the skin for 3 minutes. The percentage of moisture content in the herbal soap was evaluated to be 5.5% which is a lower value so less prone towards deterioration. The total fatty matter was 69% as higher percent represent the quality soap as lower total fatty matter relates to be less optimum for the dry skin.

Using herbal ingredients in cosmetic products offers natural, gentle cleansing and nourishment. They provide antioxidant protection, anti-inflammatory benefits, and

#### 6.7 Saponification value determination

The saponification value for the diluted soap solution was found to be 56.66 which is suitable to be used in consumer products.

#### 6.8 Determination of moisture content

The percentage of moisture content in the herbal soap was evaluated to be 5.5%. The moisture content was low as greater the moisture, more will the deterioration of the sample.

#### 6.9 Determination of content percent total fatty matter

The total fatty matter was 69%. Higher the percent represent the quality of soap as lower total fatty matter relates to be less optimum for the dry skin. Greater the fatty matter more it helps in moisturizing the skin.

antimicrobial properties. Herbal scents offer aromatherapy benefits, while their sustainability and biodegradability appeal to eco-conscious consumers. Their cultural heritage and versatility allow for innovative formulations catering to diverse skin needs. So, one should always try to prefer herbal products instead of chemically manufactured cosmeceuticals.

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#### Conflict of interest

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