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## Research



### Formulation And Evaluation Of Poly Herbal Soap

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	<b>Abstract</b>
Published on: 16 Jun 2024	<p>The main objective of the present study is formulation and evaluation of polyherbal soap by using hot process techniques. In this study, powdered dry formulation containing pumpkin seeds and leaves, papaya leaves, mint leaves, Kurunthotti leaves, nutmeg powder, Tulsi was evaluated and formulated for their antimicrobial activity. Various evaluation methods like pH, moisture content, foaming index, foam retention time, saponification value, Skin irritancy test, total fatty matter and antimicrobial testing have been done. The soap made was evaluated for their physiochemical characters such as Total fatty matter(73%), Moisture content(12.8%) , pH (7),Foaming index (17ml),Foam Retention time (10 -13 min ), Saponification value (147.262 mg KOH/g .Additionally, the evaluation tests revealed that the herbal soap performs satisfactorily against microbes when compared to conventional antibodies. The soap also exhibited good cleaning efficiency in removing microbes on skin. The herbal bath soap has been prepared and evaluated.</p>
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<b>Keywords:</b> Herbal bath soap, Tulsi, Vitamin E, Pumpkin seed	

## INTRODUCTION

Plants with medicinal properties are being used as traditional medicine from times immemorial. The extract obtained from the leaves, stem and roots various medicinal plants have been employed as a natural remedy in curing various ailments and diseases. Even though many of the plant based products have been replaced by synthetic chemicals, the safety and efficacy of Ayurvedic products has set standards. The active constituents responsible for such medicinal values are employed topically as creams, soaps, and ointments for treating skin related ailments like acne, wounds, eczemas, and ringworms, as an anti-microbial agent and for cosmetic purposes<sup>1</sup>. Nowadays, there is an increasing consumer demand for cosmetics comprising natural ingredients as healthier, organic, and ecological product. Consumers are more and more refusing synthetic chemicals in beauty and cosmetic products. A natural soap is prepared without a non-natural surfactant, with addition of functional ingredient from natural substance, such as essential oil or plant extract<sup>2</sup>. A natural soap may be generally divided based on the production method into: a melt-pour soap, a hot process soap, and a cold process soap<sup>3</sup>. The hot process soap is called a transparent or translucent soap. The soap has good detergency or cleansing power, good moisturizing effects, long-lasting fragrance, and less of irritant. Herbal soaps are prepared by adding various dried

herbs, flowers and stems into soap base. Herbs are the natural products could be found in the treatment of almost all diseases and skin problems owing to their high medicinal value, cost effectiveness, availability and compatibility, Hence it can be used in soap base<sup>4</sup>. The attribute of a soap includes gentleness on the skin, rich lather, protection against various skin disorders (including rashes, eczema, scabies) treatment of skin infection (such as ringworm), protection of even skin toning. There is very large market of various bath soaps having so many varieties including herbal soaps. Personal hygiene, getting clean is treated as a big business<sup>5</sup>. However, various skins related issues are being experienced by soap users too. Persons having skin issues like dryness, itching, acne, contact dermatitis are referred by Dermatologist and advised to use specific skin care products including specific type of soap according to skin type and related issues. Various skin types are normal, oily, dry, combination, or sensitive skin types. Factors like pH of soap and ingredients used as surfactants, high leather forming agents, colors, fragrances, can contribute skin related issues<sup>6</sup>. The surface of the skin is slightly acidic, giving rise to the concept of the acid mantle. Studies have shown that potential of hydrogen (pH) of skin increases in proportion to the pH of cleanser used. Increase in pH causes an increase in dehydrative effect, irritability and Propionibacterium count. Changes in the pH are reported to play a role in the pathogenesis of some skin diseases<sup>7</sup>. Therefore, the use of skin cleansing agents with a pH of about 5.5 may be of relevance in the prevention and treatment of those skin diseases. Unfortunately, pH is not mentioned in the labels of many products.

#### **Different types of skins and skin related issues of soap users**

Different skin types cover as normal, oily, dry, combination, or sensitive skin types. Skin type depends on things such as:

- How much water is present in skin, which affects its comfort and elasticity
- How oily it is, which affects its softness
- How sensitive it is

#### **Normal skin type**

Not too dry and not too oily, normal skin has:

- No or few imperfections
- No severe sensitivity
- Barely visible pores
- A radiant complexion

#### **Combination Skin Type**

Skin can be dry or normal in some areas and oily in others, such as the T-zone (nose, forehead, and chin). Many people have this type. It may need slightly different care in different areas.

Combination skin can have:

- Pores that looks larger than normal, because they're more open
- Blackheads
- Shiny skin

#### **Dry Skin**

Many persons have:

- Almost invisible pores
- Dull, rough complexion
- Red patches
- Skin is less elastic
- More visible lines.

A person's skin can crack, peel, or become itchy, irritated, or inflamed. If it's very dry, it can become rough and scaly, especially on the backs of hands, arms, and legs.

Dry skin may be caused or made worse by:

- Person's genes.
- Aging or hormonal changes
- Weather such as wind, sun, or cold
- (UV) radiation from tanning beds.
- Indoor heating, long, hot baths and showers
- Ingredients in soaps, cosmetics, or cleansers, Medications

### **Oily Skin Type**

Such persons may have:

- Enlarged pores
- Dull or shiny, thick complexion
- Blackheads, pimples, or other blemishes

Skin related Issues:-

High alkaline soap means there are lots of un-saponified lye left in soap, it can irritate skin. This is especially so for anyone with sensitive skin, including young children. Irritants in traditional soaps can cause dryness, contact dermatitis, inflammatory acne and throw off the delicate pH balance your skin maintains for both face and body.

### **Contact Dermatitis**

Soap bars containing a potent antiseptic, tetrachlorosalicylanilide (TCSA), can leave with some fairly serious side effects. TCSA was linked to an entire epidemic of photo allergic contact dermatitis in England in the 1960s. The parts of body exposed to an irritant, like TCSA or even strong fragrances in harsh soap and cosmetics, can break out into a red, often itchy rash accompanied by dry, cracking skin, oozing blisters, swelling and burning. Steer clear of TCSA, as well as other trouble chemicals like anionic surfactants, which are widely accepted as potent irritants to human skin. They are the most commonly used class of surfactants due to their relative ability to solubilize fats and oils. They may also solubilize the lipid membranes of skin cells<sup>8</sup>.

### **pH Damage**

Our skin needs to maintain a specific, fairly acidic pH to function properly. The acid mantle, a thin, protective layer, is primarily composed of sebum: the skin's naturally produced oil. Its integrity is susceptible to irregularities caused by internal and external factors, like diet, pollutants and harsh soaps. To keep skin healthy, the acid mantle needs to be able to do its job, and to do its job we need to avoid cleansers that could upset its pH balance. Highly alkaline soaps, which contain more of the lye that brings about saponification, have been linked to disruptions in the skin's pH balance. In a study on the effects of soap and detergents on skin surface pH in infants, the greatest increase occurred after washing with alkaline soap the study concluded that any increase in the skin's pH level could irritate the protective acid mantle and impair the composition of healthy bacterial flora and enzyme activity. Dissolution of fat from the mantle due to the change in pH could allow skin to become dry and scaly<sup>9</sup>.

### **Dryness**

Dry skin looks about as good as it feels: tight, uncomfortable and, in some instances, even painful. Harsh cleansers can strip the skin's natural oils, leading to dryness and irritation. Surfactants in cleansers can damage proteins and lipids in skin, leading to tightness, itching, and dryness and barrier damage after washing, according to a study published in Dermatologic Therapy. The study concluded that cleansers first have to minimize damage to lipids and proteins before they can even begin to care for skin. Only then can they deliver beneficial agents like occlusive, skin lipids and humectants that improve hydration<sup>10</sup>.

## **MATERIALS**

Pumpkin leaves, Pumpkin seeds, Papaya leaves, Mint leaves, Kurunthotti leaves, karpuravalli, Nutmeg fruit, Jasmin essence, Tulsi leaves, Olive oil, Glycerine soap base, Vitamin E Capsule

### **Preparations**

*Pumpkin leaves:* Pumpkin leaves was collected and dried under the sunshade for 1 week to prevent microbial contamination. It is then powdered and stored in an air tight container.

*Pumpkin seeds:* Pumpkin seeds were collected from pumpkin. It is then kept under sunshade and dried for more than 1 week. After drying, it is grinded with the help of a mixer. The dried powder was packed in an air tight container.

*Papaya leaves:* Papaya leaves was collected and dried. This is then grinded into fine powder. Finally transferred into an container.

*Mint leaves:* Mint leaves was collected and dried under sunshade. It is then crushed into fine powder using a mixer and then stored in an container

*Kurunthotti leaves:* Kurunthotti leaves was collected and kept under sunshade for 1 week .it is then powdered and transferred into a container.

*Tulsi leaves:* Tulsi leaves were collected from tulsi plant. Then it is kept under sunshade for 6 days. After complete dryness, it is grinded into a powder form. At last it is packed into an air tight container.

*Karpuravalli:* Karpuravalli was collected and dried. Then make into an fine powder with the help of an mixer. Transfer this powder into an closed container.

*Nut Meg:* Nutmeg was collected from nutmeg fruit. It is then kept under sunshade for atleast 2 weeks for their complete dryness. After drying, it is crushed with the help of an mixer. Then preserved in an air tight container. Quantity to be taken for polyherbal soap.

Sl .no	Ingredients	Official formula
1	Pumpkin seeds	8
2	Papaya leaves	6
3	Mint leaves	2
4	Pumpkin leaves	4
5	Nutmeg	6
6	Kurunthotti leaves	2
7	Karpuravalli leaves	2
8	Jasmine essence	Qs
9	Tulsi leaves	2
10	Glycerine soap base	16
11	Olive oil	4
12	Vitamin e capsule	4
13	Water	Qs

### Procedure

Take 8g of pumpkin seed powder in a beaker, then this beaker may be add 6 g of papaya powder, 2 g of mint powder, 4 g of pumpkin leaves powder, 2 g of kurunthotti powder, 6 g of nutmeg fruit, 2 g of Tulsi powder, 2 g of karpuravalli powder and water (q.s). Mix all the ingredients to 3- 4 minutes. The double heat method was given for melting glycerin soap base. For that, take a copper water bath on induction and add some water on it. Then place a beaker containing 16 g of glycerin soap base in the copper water bath and heat until it melts. After melting, add the above mixture to the soap base. Now mix all the ingredients and stop heating. Finally add 4 ml of olive oil and jasmine essence [q.s]. Then take the appropriate soap mould and pour the prepared solution into it .Stand it for atleast 8 hours in a room temperature. Finally, the soap is ready. This poly herbal soap gives better compatibility with all types of skin. It has no side effects and only natural ingredients are added. It also possesses antibacterial activity.

**Packing:** After formulation, the poly herbal soap was covered in a butter paper, packed and labelled.

### Evaluation tests

The formulated poly herbal soap was evaluated for the following:

#### Organoleptic evaluation

- Colour: greenish – brown
- Odour: characteristic
- Appearance: good

#### Physical evaluation

##### • pH25

10% of soap solution was prepared by dissolving 10gm of soap in distilled water in a volumetric flask of 100ml. For the determination of PH, PH meter was used. Electrode was introduced into the solution and the pH was noted down. The ph was found to be 7.

##### • Foam forming ability

For the determination of the poly herbal soap for its ability to form foam about 1.0gm of soap was taken and was dissolved in distilled water (about 50ml) in a 100ml graduated measuring cylinder it the measuring cylinder was then shaken for about 2-3 minutes and it was allowed to stand for about 10min. Foam height was measured after 10mintes. The form forming ability was found to be 17 ml.

##### • Retention time of foam

Foam retention time refers to the time for which the foam produced by the soap retains. The above procedure was repeated and the foam interval was measured for about 5-10minutes. The Retention time of foam was found to be 10 – 13 Minutes.

#### • Saponification value determination

For the determination of saponification value about 2gm of the sample was taken in a conical flask and 0.5M KOH solution was added to it. This mixture was heated to about 55 degree Celsius along with stirring continuously on a hot water bath. Then the temperature was further increased 100 degree Celsius and boiling was continued for about 1-hour Titration was performed with phenolphthalein as an indicator and 0.5M HCl. The end point observed is pink colour disappearance. Saponification is calculated as:

Saponification value : Avg. volume of HCl 28.056/ Weight of oil (g) :A = Titre value (11.5) :B = Blank ( 1) : (B - A) × 28.05/2 :(11.5 - 1) ×28.05/2 :10.5 ×14.025 :147.262 g/ml

#### • Moisture content

About 10g of sample under study were accurately weighed and transferred to a china dish of known weight and kept in hot air oven at 100 to 105 degree celsius for an hour. Then , sample was weighed along with china dish to deduct the actual weight of china dish. The weight of the content was noted to calculate the percentage moisture content.

Moisture content = (difference in weight / initial weight) ×100 =10 -8.72 /10 100 =1.28/10 ×100 =12.8 %

#### • Total fatty matter

In the presence of hot water, soap is reacted with acid the total fatty matter was determined. 10g of soap was weighed and 150 ml of distilled water as added and it was then heated.it was then dissolved in 50 % of con. Sulphuric acid (about 20 ml) along with heating. It was heated until a clear solution is obtained. About 7 g of beeswax was dissolved to obtain the solidified fatty acids on the surface itself and for meant to cool them. Obtained cake was dried and weighed.

TFM = ( A - X)/W× 100 A = Weight of wax +oil (14.3 ) X=weight of wax ( 7 ) W= weight of soap (10 ) TFM = 14.3 -7/10 ×100 = 7.3 /10 ×100 = 73 %

#### • Antimicrobial testing

The given sample of the soap was tested for its anti-microbial properties. By bore diffusion method. The micro organism used was E.coli. In this method soap solution was prepared by dissolving 1g of soap in distilled water. Various concentrations were produced such as 5, 10, 20, 50mg/ml,the anti biotic used is ciprofloxacin -5µg. The plates were then kept for incubation for about 24hrs at a temperature of 37 degree celcius.

#### • Skin irritation test

This evaluation test should be carried out on human volunteers. For formulated soap, volunteer were selected and the formulated soap should be applied on an area of two square inch to the back of hand. The volunteers were observed for lesion or irritation.

## RESULTS AND DISCUSSION

The poly herbal soap results of various evaluation parameters are shown in the below table. The table depicts that the pH of the herbal formation was found to be 7, which was optimum for its utilization on the skin. Higher as well as lower Ph refers to the harmful effects on the skin .The foaming index was found to be 17ml while the foam retention time is 10 -13 minutes .this means that the lather producing ability of the soap was satisfactory and stable. The total fatty matter determination was 73% respectively. The quantity of the soap is represented by the total fatty matter .If the total fatty matter is lower, and then it is not optimum for the dry skin. Greater the fatty matter more it helps in moisturizing the skin. The saponification value was found to be 147.262g/ml. Moisture content (12.8 %) and skin irritancy test was also evaluated. Finally, microbial growth study was conducted and determined.

Sl. No	Evaluation parameter	For polyherbal soap
1	PH	7
2	Colour	Greenish – Brown
3	Odour	Characteristic
4	Form forming ability	17ml
5	Retention	10-13 minutes
6	Saponification value	14.262 g/ml
7	Total fatty matter	73 %
8	Moisture content	12.8 %

The prepared poly herbal soap contains all goodness of natural ingredients. Apart from acting as a poly herbal soap this formulation has been used traditionally for treating several epidermal disinfections. The glycerin base is used as the soap base in this formulation. Pumpkin leaves helps in keeping away the free radicals and toxins that often damage the skin. Moreover, the higher water content in the leaves help retain moisture and make skin soft. Papaya leaves used for the preparation also promotes moisture retention and improves the skin elasticity. Nutmeg is the best ingredient to reduce inflammation and irritation of the skin, hydrates the skin from deep within, thereby providing a more complexion and tone. kurunthotti leaves helps to repair, restore and revamp skin texture. Tulsi leaves are beneficial for acne due to its anti bacterial properties. Karpuravalli powders are widely used in skin face packs. Combination of all these herbs will turn the product into a multipurpose herbasoap. Organoleptic evaluation revealed that the soap is smooth and good in cleansing. It also showed considerable antibacterial activity. The PH of the soap was found to be 7 and was determined using ph meter. Remaining parameters such as foam height, foam retention, moisture content, total fatty matter and skin irritation test were also determined and the results are tabulated in table No 2. The formulation was found to be stable and can be stored at any temperature at any place. It is also free from chemicals. However, the regular use of this herbal soap provides clear and smooth skin. Since the natural ingredients are known for their nontoxic properties and no preservatives, artificial colors are added. so the chances of degradation are almost close to minimal, this leads to increased shelf life.

## SUMMARY AND CONCLUSION

During this project work, our team had finally achieved the desired results and formulation to make the poly herbal soap which does not contain any harmful effects. The prepared polyherbal soap was formulated using hot process technique with antibacterial property. The plant of papaya, tulsi, kurunthotti, karpuravalli, nutmeg, mint, pumpkin constituents extraction was studied. The prepared formulation when tested for different test gave good results. It does not give any irritancy to skin as it was determined by using these soap in few volunteers. Furthermore, the prepared soap were standardized by evaluating various physico chemical properties such as pH, odour, color, antimicrobial, total fatty matter in which they exhibit satisfactory effect.

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