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Formulation an evaluation of herbal paper soap

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Abstract

The aim of the formulation is to determine the formulation of paper soap using tulsi leaves with glycerine an essential oil and the quality of soap which is disposable hand wash. This experiment used laboratory experiments method using descriptive analysis.

Ocimum tenuiflorum is the most sacred herb in India and is otherwise called as Krishna tulsi. *O. tenuiflorum* belongs to lamiaceae family, which possess various healing properties for human life. Traditionally the various parts like leaves, flowers, stems are being used in the treatment of various disorders. It is having anticancer constituents it's also used as antiviral, ant inflammatory, analgesic and immune stimulatory properties. The aim of the work is to highlight the updated review of scientifically proved medicinal activities of tulsi against various disorders a sanitization when utilised in the major herb used in production of herbal paper soap.

The herbal paper soap was formulated using the leaf of Krishna tulsi plant. Ayurvedic cosmetic also known as herbal cosmetics the natural content in the herbs do not have any side effects on human body the herbal ingredients are based on several botanical ingredients.

The parameters used such as moisture content, stability if foam, Ph. value, free alkali content, weight gain, visual analysis, organoleptic test. The result of physiological characters was revealed. These steps were carried out for the best result of our soap formulation.

Keywords: Paper soap, coconut oil, castor oil, tulsi, glycerine, lavender oil

Introduction

Human skin is the outer covering of the body constituents the first line of defences against various pathogens. As the skin interfaces the environment, it is constantly exposed to different environmental stimulus a reaction, which make skin damage. Similarly damage skin will usually form scar tissue mostly hand is a part of body which connects to pathogens even through working in day-to-day life so therefore soap has been made as formulation which is mostly used in our day-to-day life to fight against various pathogens. A soap is the potassium salt (or sodium salt) of a long chain carboxylic acid (fatty acid) which has cleansing properties in water. It is a salt of strong base (NaOH) and a weak acid (carboxylic acid), so a solution of soaps in water is basic in nature.

It is any water-soluble salt of whose fatty acid which contains eight or more carbon atoms. Hence, soap in its various forms, is a high demand. It depends on its washing action on the fact that its molecules process one ionic (polar, water-attracting or hydrophilic) end and one covalent (non-polar, water repelling or hydrophobic) end which attracts oils and greases (Namiesnik. *et al.* 2011) ^[16] thus, soap molecules can make water and oils come into an emulsion which can be washed away.

Soaps also contains additives for some desired qualities. These include salt, soda ash, colour, citric acid, sodium silicate, sodium bicarbonate, perfume, borax trisodium phosphate and magnesium sulphate, sometimes superior to the phosphate used alone.

Basically, all soaps are made by saponification hydrolysis of naturally occurring fat and oil by sodium hydroxide (caustic soda) or potassium hydroxide (caustic potash).

Fats and oils are composed of triglycerides; three molecules of fatty acids attach to a single molecule of glycerol. The alkaline solution, which is often called lye (although the terms "lye soap" refers almost exclusively to soaps made with sodium hydroxide), brings about a chemical reaction known as saponification. In this reaction the triglyceride fats first hydrolyzed into free fatty acids, and then these combine with the alkali to form crude soap: an amalgam of various soap salts, excess fat or alkali, water, and liberated glycerol (glycerine). The glycerine, useful by-product can remain in the soap product as softening agent, or be isolated for others uses.

Soaps are key component of most lubricating greases, which are usually emulsions of calcium soap or lithium soap and mineral oil. These calcium- and lithium- based greases are widely used. Many other metallic soaps are also useful, including those of aluminium, sodium, and mixtures of them.

According to WHO (World health organization, central for disease control and prevention and other trusted health care authorities, until large scale measures to combat proper hygiene in act in a report in medical news today, reaches estimated that just a 40% increase in proper hand washing and sanitizing measures by those who don't already wash carefully could cut the spread of disease.

Liquid soap are the transparent solution of fatty potash up to 20% of fatty acids and upto 1% of fragrances. Liquid soaps include moisturizing agents do that your hand may not dry out as quickly form frequently cleaning your hand. Liquid soap is the most efficient in terms of prices business consumers and also home consumers. It is also popular product among users. There is fewer waste with soap especially liquid soap than it with hard soap. It has also better germ control activity. Ordinary hand soap was prepared with different fragrances and colours. Comparatively newly prepared liquid soap was prepared with good moisturizing property. The better fragrances and germ fighting capabilities make them convenient soap for hand washing.

Plant profile

Krishna tulsi

Synonym: Holy Basil, Ram Tulsi, Shyama-Tulsi



Fig 1: Tulsi leaves

Biological Source: It consist of the fresh or the dried leaf or other arial parts of *Ocimum sanctum*

Krishna tulsi also known as *Ocimum sanctum*, holy basil, or tulsi (also spelled tulsi), is an aromatic plant in the family Lamiaceae which is native to the Indian subcontinent and widespread as a cultivated plant throughout the southeast Asian tropics.

The beneficial reason is that they might offer a natural safeguard against the development of certain conditions and be a ruptured treatment for some disease or alignments. Tulsi is cultivated for religious and traditional medicine purposes, and also for its essential oil. It is widely used as a herbal tea, commonly used in Ayurveda, and has a place with in the Vaishnava tradition of Hinduism, in which devotees perform worship involving holy basil plants or leaves.



Fig 2: Dried tulsi leaves



Fig 3: Dried tulsi leaves powder

Morphology

Ocimum Tenuiflorum is native throughout the old-world tropics and widely cultivating for its, holy basil is an erect, many-branched sub herb, 30-60cm (12-24ft) tall with hairy stems. Leaves are green or purple; they are simple petiole, with an ovate blade up to 5cm long, which usually has a slightly toothed margin; they are strongly scented and have a decussate phyllotaxy. The purplish flowers are placed in close whorls on elongated racemes.

The main morphotypes cultivated in India and Nepal are Ram tulsi (the most common type, with broad bright green leaves that are slightly sweet), the less common purplish green-leaved (Krishna or Shyama tulsi) and the common wild Vana Tulsi.

Table 1: Scientific Classification

1	Kingdom	Plantae
2	Division	Magnoliophyte
3	Order:	Lamiae's
4	Family	Lamiaceae
5	Clade	Tracheophytes
6	Genus	<i>Ocimum</i>
7	Species	<i>Ocimum tenuiflorum</i> Linn.

Chemical Compositon

The main chemical constituents present in *O. tenuiflorum* are oleanic acid, ursolic acid, Rosmarinus acid, eugenol, carvacrol, linalool, and beta- caryophyllene. Tulsi essential oil consists mostly of eugenol, beta- element, beta-caryophyllene, and germacrene (2%) with the balance being made up of various trace compounds, mostly terpenes

Extraction

- Fresh tulsi leaves (Krishna tulsi) collected from shrub plant.
- Then washed properly to avoid any foreign particles in the preparation.
- Plugged leaves crushed or grind to the finest with amount of aqueous solution.
- Boiled for half to one hour to receive Phyto constituents.
- The obtained content then filtered with the use of muslin cloth.
- And the extract can be used for other properties.
- For centuries, the dried leaves have been mixed with stored grains to repel insects.

Mechanism of action (Holy Basil)

The mechanism of action of holy basil on these parameters believed to be largely due to the herb's potent anti-inflammatory effect. Holy basil's protective action is due in part, too its free radical scavenging effect. This also reduces oxidative cellular and chromosomal damage from radiation.

Materials and Method**Table 2:** Formulation of paper soap

SL/No	Ingredients	Amount
1	Liquid soap was prepared by hot process	-
2	KOH	15gm
3	Citric acid	2ml
4	Distilled water	300 ml
5	Lavender	3ml
6	Glycerine	30ml
7	Castor oil	10ml
8	Coconut oil	50ml
9	Nacl	16gm
10	Sorbitol	2:1
12	Any paper (eg- Watts Mann filter paper, butter paper)	Required amount

Part A: Materials and method for liquid soap preparation**Materials required**

1. We require hand gloves form protecting our hand from harmful chemicals.
2. Nose mask is required because the chemicals used such as lye is irritant to nose.
3. Turning stick a log spatula is required for adding and stirring purpose of chemicals mixing.
4. Measuring soon a funnel is required for filtration purposes.
5. Plastic bowls a glassware's i.e., measuring cylinder, beaker, conical flask etc.
6. Towel for cleaning purpose.
7. Distilled water plenty amount.
8. Thermostat and water bath for heating a saponification process.
9. Bunsen burner for boiled.

Method for preparation of liquid soap**1) Prepare Glycerin**

Measure of glycerine into beaker of required size and heat it on 60 °C, stir glycerine gently a check temperature with thermometer.

These actions ultimately help reduce end-organ damage and improve post-radiation recovery.

Limited clinical studies have shown promise with being able to deliver higher doses of therapeutic radiation in patients' taking holy basil. It's an anti-bacterial and anti-inflammatory properties and its herb that gives gorgeous skin in just few days using it. This also reduces oxidative cellular and chromosomal damage from radiation.

Ocimum shows anti-bacterial activity due to presence of eugenol and linalool which increase the permeability of plasma membrane, inhibit the microbial respiration which causes the death of bacterial cell due to massive ion leakage. Antipyretic activity is due to prostaglandin inhibition. Anti-histamine effect is due to this reason that it effects the histamine H2 receptor causing histamine intolerance and inflammation is not produced.

Uses

Increase – Apoptosis stimulation, toxic induction, oxidative stress and lipid peroxidation.

Decreases-free glutathione, angiogenesis, and metastasis.

2) Prepare coconut oil and castor oil mixture

Weigh 50 ml of coconut oil in required amount of beaker, heat coconut oil gently to melt the oil, and take 10ml of castor oil and pour to coconut oil and mix the oils by continuous stirring

3) Prepare Koh Solution

- The 50 mL of water and 15gm of Potassium Hydroxide solution added to the flask. The mixture stirred by using stirring rod to mix the contents of the flask. Then keep KOH covered.
- As KOH dust can be effective to nostrils and throat. Avoid breathing the dust or fumes when mixing KOH solution.

4) Mix Soap

- Gently pour KOH/water solution into glycerine. Heat the soap and maintain Temp of 60-70 °C. The mixture was stirring continuously during the heating process to prevent the mixture from foaming. If the mixture should foam to the point of nearly overflowing, the flask removed from the boiling-water bath until the foaming subsides, then continue heated. The mixture heated for 2-3hours until it undergoes complete saponification.

- Then add NaCl solution on the mixture with continuous stirring. The NaCl solution was prepared by adding 16gm of NaCl into 200ml of water and stir it properly until the NaCl salt dissolves properly then the mixture of alkali, fats an oil, glycerine and salt were heated in thermostat until it goes proper saponification.
- The mixture was removed from the boiling-water bath and the flask cooled in an ice bath for 10-15 minutes.
- While the flask is cooling assemble the vacuum filtration apparatus, the vacuum flask secured to a ring stand with a utility clamp to prevent the apparatus from toppling over.
- A piece of filter paper weighted to the nearest 0.001 g and recorded. The filter paper placed inside the Buchner funnel. The filter paper was moisture with water so that it fits flush in the bottom of the funnel, The 150 mL of saturated, NaCl solution added to the flask to salt out the soap once the flask has cooled.



Fig 4: Liquid soap prepared

Collection, Identification and processing of plant

The leaves of *Ocimum tenuiflorum* were collected from different matured plant. The leaves were dried and kept in airtight bottles for studies. It involves two processes

- **Preparation of herbal extract** – 300g of fresh tulsi leaves were crushed or grinded. then the crushed leaves were filtered through muslin cloth a then filter paper. The crude extract was complete to use



Fig 5: Extraction method

Addition of crude extract to liquid soap preparation

Then the needed amount herbal extract was added to fully saponified soap preparation by continuous stirring until it dissolves properly.

6) Optional

At this point we can add few grams of essential oil for scent of soap. Concentrated essential oil is strong and goes long way.

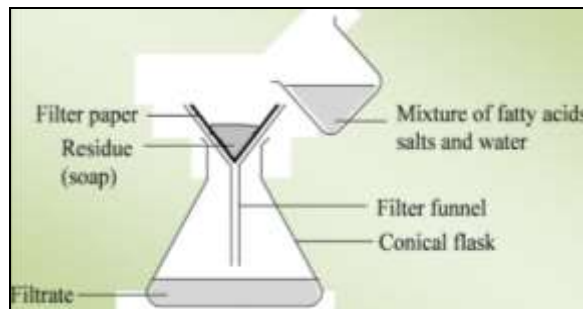


Fig 6: Filtration of soap

Part 2: Materials and Method of Preparation of Paper Soap

Materials required

1. To start your paper soap, you will need few sheets stock of papers i.e. watts man filter paper, butter paper and 3 point face stock paper.
2. You will need ruler or scissors and a few paints brushes a tray
3. Prepared amount of liquid soap
4. Small storage containers and a way to hang a dry paper soap, some string, tape, clips, can be used.

Phase-I Selection of soap solution soaps were prepared and coded as X and Y. Soap solution of varied concentration (5, 10, 15, 20% w/v) were prepared. Formation of foam was avoided during solution preparation. Foam test was the criteria for selection of good soap. The soap capable of producing maximum foam was selected. Selection of paper Six different branded papers (Whatman filter paper no. 41 and 42, filter paper, bond paper and butter paper) were selected and coded as A, B, C, D, E, and F. They were evaluated for their absorption capacity and weight gain. The paper showing maximum absorbing capacity was considered as the best paper.

Phase-II Formulation of herbal paper soap strips the herb was incorporated in the selected formulation which showed good absorption capacity in phase-I studies. Accurately weighed was mixed with 15% soap powder and distilled water was added under constant and continuous stirring until a uniform soap-herb solution was formed. Then paper soap strips were prepared.

Formation of herbal paper soap strips

The paper soap strips were prepared by Dipping technique using modified disintegration apparatus and air dried overnight at 37±2°C. For this purpose, different papers were dipped one after another into the soap solution and air dried overnight. Evaluation of herbal paper soap strips the prepared strips were subjected for determination of size, shape, weight variation, pH and foam test by a reported standard method and an average of 20 strips was taken.

Evaluation of Herbal Paper Soap**A) Evaluation of herbs used****Organoleptic evaluation**

- A. **Colour** - Green
- B. **Odour** – Aromatic
- C. **Appearance** – Good

B) Evaluation of Liquid Soap**Organoleptic evaluation**

- A. **Colour** –Brown
- B. **Odour** – Pleasant, Aromatic.
- C. **Clarity** – The test was done by keeping the liquid soap under the white background

C) Evaluation of paper soap**Organoleptic evaluation**

- A. **Size** -3/5cm.
- B. **Shape**-rectangle
- C. **Odour**-aromatic, pleasant, sweet.

D) Physical evaluation of herbal paper soap: The herbal paper soap was formulated and was evaluated for following properties

- a) **pH:** The pH was determined before and after the preparation of paper soap. At first the liquid soap was prepared and the pH was detected by using litmus paper the result was red litmus paper turned blue in colour and blue litmus remained unchanged. Then after the production of paper soaps the piece of paper soap was taken and added into water and then Shaked fully then the pH meter was used for testing of pH.
- b) **Foam retention:** The soap strips was taken and added in water solution in a measuring cylinder the cylinder was covered with hand and was shaken for 10 times. The volume of the foam was checked in 1 minute interval. The foam height was found to be
- c) **Anti-microbial activity of tulsi leaves:** There was various study conducted on antimicrobial activity of paper soap conducted using tulsi plant as a herbal extract. Microbial study was done using microorganisms. For checking the effectiveness of the herb uses the fungi a virus was grown in the culture media the soap strip was placed in the surface of the agar media then it was placed in the incubator for about 24 hrs at 30 c The herb diffuses out of the strip into the agar and the microbials activity was recorded
- d) **Foam Height:** The sample was dispersed in 20 ml of distilled water and then transferred into the measuring cylinder and then it was Shaked for a min and immediately its foam height was calculated as F1 and then after 10 – 15 min measure the foam height and the foam height were measured and noted as F2 it should be 2 cm.

Foam height calculation – F1 – F2

- F1 -3.5cm
- F2- 1.5cm

Therefore, the foam height was =3.5-1.5 = 2cm

- e) **Total moisture content:** The moisture content was estimated by measuring the weight of water content in soap and the difference in the weight after the paper soap is fully dried in 100 to 115 c or by using dryer The formulae used to find the moisture content is:

%Moisture content = initial weight – final weight / final weight *100

- Initial weight = 0.110gm
- Final weight = 0.190gm

Therefore, %Moisture content = 0.110-1.190/0.190x100.

I.e. – 0.00421

- f) **Determination of % free alkali:** One piece of sample was added and boiled in alcohol for 30 min under reflux water bath, then cooled and phenolphthalein was added and then titrated in 0.1 N HCL solution.
- g) **Stability Test:** Short term stability studies was done in the period of 8 days for the formulations. The sample was stored in different storage temperature i.e., room temperature 37°C and at refrigerator 2 to 80°C. Sample was withdrawn on interval and analysed for visual appearance, clarity, pH and drug content.
- h) **Primary skin irritation test:** For this at least three volunteers was selected and prepared soap strips was given an applying in hand the amount of irritation was been checked.
- i) **Foam stability test:** Foam stability is the consistency of the amount of foam produces by paper soap. The resulting foam on paper soap is smoother than the regular soap. The foam can be stable in the presence of foaming agent solution containing surface active agent will produce stable foams, when mixes with water Glycerine actually does not contain ant surface active agents and don't have significant effect on foam stability.
- j) **Saponification test :**The saponification test was done by taking 3 ml of sample i.e., different kind of fats (oil) mixed well with 25 ml of KOH solution and mix well put the mixture into water bath for 30 min and cool add phenolphthalein indicator and triturate it against 0.5 N HCL. Then perform blank titration without taking the sample.
The saponification was done by taking both castor oil a coconut oil as fat.

The formulae used for calculation of saponification value is

Saponification value = (A-B) * N*56.1/W

- A-H₂SO₄ for blank.
- B-H₂SO₄ for sample.
- N-normality i.e., 0.5NHCL.
- 56.1 – equivalent weight of KOH.
- A. For coconut oil –
 - Saponification value = 40-12x0.5x56.1/3
 - I.e., 261.8
- B. For castor oil –
 - Saponification value = 31-12x0.5x56.1/3
 - I.e.,178.28

Conclusion

Soaps are one of the most essential things that are being used every day. It is used for cleaning and washing the body and it ensures that the microbes in the external parts, such as the skin, would be removed. In terms of hygienic measures, soap is a prominent cleanser that helps people eradicate germs and bacteria that made contact with the skin, as well as maintain body's health and sanity. Literatures have shown that presence of thick foam on the infected part

causes hydration of stratum corneum and results in better penetration of drug. Thus, to overcome the disadvantages of soap bars, herbal paper soap strips are formulated. These herbal soap strips are simple, convenient to use, economical and can be used by patients of all ages and sex. The addition of main herbal ingredient in paper soap such as Tulsi is advantageous because of their anti-bacterial properties beneficial for dermatitis, psoriasis, eczema and other skin related disease or issues is found to be more effective for bacteria and fungi. No medication has been added which shows non-irritant functions on skin, maintains the skin natural pH without destruction or peeling-off of palm skin and fragrances are added at the last (lavender, peppermint and lemon essential oils) it shows anti-bacterial, anti-fungal which gives proper odour and also have therapeutic action. Today hand washing soap is practical to carry everywhere. Paper soap itself is soap product innovation which is molded as thin paper. The paper soap is easy to carry and therefore is used mostly by travellers. They are completely assembled with covered paper strips and can be carried anywhere. They are undoubtedly outstanding amongst other travel cleansers. The paper soap has vegetable oil which added together with cleansers with handcrafted paper sheets. The coconut oil and castor oil which profoundly purifies skin

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