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Formulation & Evaluation of Herbal Neem Soap

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Abstract: *Our study's goal is to create herbal hygienic soap with an antibacterial component and a cold process technology. Coconut oil, castor oil, neem oil, lavender oil, rose oil, and NaOH (lye) were used to make herbal soap. Various extracts were added to the basic saponification reaction. Using varying concentrations of soap solution, the herbal formulation was created and assessed for antimicrobial tests, pH, moisture content, foaming index, foam retention time, saponification, and TFM (total fatty matter) soluble matter in comparison to standard. When compared to antibiotics, the herbal soap has satisfactory antibacterial properties. Additionally, oils are included for everyday use and to cure a variety of skin infections.*

Keywords: Poly herbal soap, Evaluation, saponification value, antimicrobial potential

I. INTRODUCTION

There is a huge market for several types of bath soaps, including herbal soaps. Cleaning and personal hygiene are viewed as major business. However, soap users are also experiencing a variety of skin-related problems. Dermatologists refer people with skin conditions such dryness, itching, acne, and contact dermatitis and counsel them to use particular skin care products, such as soaps, based on their skin type and associated problems. Normal, oily, dry, combination, and sensitive skin types are among the several varieties of skin. Skin-related problems may be caused by elements such as the pH of soap, surfactant components, high leather-forming compounds, colors, and perfumes. The idea of the acid mantle originated from the skin's somewhat acidic surface. Research has indicated that the skin's potential hydrogen (pH) rises in direct proportion to the cleanser's pH. An increase in pH raises the number of Propionibacterium bacteria, irritation, and the dehydrative impact. It has been suggested that several skin illnesses are influenced by changes in pH. Consequently, the prevention and treatment of those skin conditions may benefit from the use of skin washing products with a pH of roughly 5.5.Sadly, many product labels omit information about pH. Given the aforementioned information, our team has concentrated on analyzing the properties of soaps that are on the market in order to determine their pH. Additionally, we have developed a preparation for creating herbal soap and addressing pH neutralization during the soap-making process. Additionally, the report will describe and clarify these issues.

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

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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

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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 look 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

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Oily Skin Type

• Such persons may have:

• Enlarged pores

• Dull or shiny, thick complexion

• Blackheads, pimples, or other blemishes

Skin related Issues: -

A lot of un-saponified lye is left in high alkaline soap, which can irritate skin. Those with delicate skin, including small children, should be particularly aware of this. Dryness, contact dermatitis, inflammatory acne, and disruption of the delicate pH balance your skin maintains for both your face and body can all be caused by irritants found in traditional soaps.

Contact Dermatitis

Tetrachlorosalicylanilide (TCSA), a strong antiseptic, can cause some quite severe negative effects when used in soap bars. In the 1960s, TCSA was connected to a whole outbreak of photoallergic contact dermatitis in England. A red, itchy rash with dry, cracking skin, oozing blisters, swelling, and burning can appear on body parts exposed to an irritant, such as TCSA or even strong smells found in harsh soap and cosmetics. Avoid TCSA and other problematic compounds, such as anionic surfactants, which are generally acknowledged to be strong skin irritants. Because of their considerable capacity to solubilize fats and oils, they are the most widely employed class of surfactants. Additionally, they might dissolve the lipid membranes of skin cells.

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. The pH balance of the skin has been found to be disturbed by very alkaline soaps, which contain more of the lye that causes saponification.

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According to a study on how soap and detergents affect an infant's skin surface pH, washing with alkaline soap caused the biggest increase. According to the study's findings, any rise in the pH of the skin could irritate the protective acid mantle and affect the enzyme activity and makeup of beneficial bacterial flora. . Because of the pH shift, fat from the mantle may dissolve, causing dry, squamous (scaly) skin. Unwanted discomfort might result even from products

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designed especially for dry, sensitive skin.Twelve common soaps and 17 products marketed for dry skin were evaluated for irritant factor in a study published in the International Journal of Dermatology. Based on the product's pH, they discovered that some creams intended for dry skin actually irritated people.

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, 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.

Another study of elderly participants prone to dry skin showed that high levels of trans epidermal water loss, which can lead to low skin hydration and reduced surface lipid content, were associated with using products that had a high pH.

Inflammatory Acne

It seems counterintuitive, but the cleanser you‘re using to rid your skin of dirt and oils that clog pores could be contributing to the very acne you‘re trying to prevent or clear up. Cleansing agents such as harsh soap with a higher pH may damage the acid mantle‘s natural antimicrobial defences and lead to acne vulgaris, among other conditions, according to a study published in Skin Pharmacology and Physiology. The study postulates that using a moisturising cleanser with a pH of about 5.5, the same natural pH as your skin, could prevent and treat acne. It may also allow recovery from other consequences of using harsh soaps.

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Literature Review

History of soap making and basic ingredients of soap: The precise nature in which soap came to be discovered is somewhat unclear and there are various legends surrounding its beginnings. The following timeline gives a broad indication of how it all started and how it progressed to the product we have come to enjoy as the modern soap.

The chemistry of soap :-

The Sumerians (approx. 3000BC) used slurry of ashes and water to remove grease from raw wool and cloth so that it could be dyed. Ashes were referred to as _al-qualy‘ and modern chemistry uses the word _alkali‘ which is derived from this original word. Modern analytical methods have shown that ashes have a high alkali content which is one of the basic ingredients of soap-making. Modern chemistry has made the understanding of the process of soap-making much clearer. Essentially, the production of soap entails a chemical reaction involving the saponification of fats by an alkali such as sodium hydroxide (traditionally, this was lye, originating from the Old English word léag, meaning _to wash‘ or _to lather‘). The reaction releases glycerine (or glycerol) which can remain in the soap to varying extents as a softening agent but some manufacturers separate it from the final product. The type of alkali and fats used determines the type of soap yielding any number of combinations on formulation and creating the many wonderful varieties that are on the market today.

Natural soaps

Even before soap started to make an appearance, early civilisation looked to nature. The soapwort plant (Saponaria officinalis) was mixed and agitated with water giving rise to the first natural soap. Modern interest or resurgence in natural skincare products has led to soap making using only plant fats and plant-based alkalis and using only natural fragrances such as essential oils to add fragrance to the final product. Advances in modern soap-making as well as our understanding of the chemistry of soap ingredients has also enabled superior products that are now refined for different purposes. Soap in the mid-19th Century became a separate commodity from laundry soap which we now refer to as household detergents (modern petroleum-based detergents cannot, by law, be called soap). Laundry soaps were far too strong and drying to be used on the skin but were more suited to cleaning hard

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surfaces and clothes. Advances in technology and chemistry has enabled variations of soaps such as liquid soaps and shower gels, the latter which were invented in the 1970s to enter the market and which have now become the mainstay for most households.

Fig.no.1 Saponification

Aim & Objective :

Formulation And Evaluation Of Herbal Soap Taking Different Bioactive Plant By Cold Saponification Method.

Objective :

1. To promote the bright skin.
2. To reduce dark spots.
3. To help to stop dry skin.
4. To make skin smooth and soft.
5. soap an hold moisture and protect the skin

MATERIALS AND METHOD

Since the prehistoric era, herbal remedies, plant products, and extracts have been used. Plants comprising with pharmacological active properties are in usage since the existence of mankind as functional meals, medications, cosmetics, colors as well as in prevention, cure and treatment of numerous ailments. A natural cure for the illness or condition is provided by the extract made from roots, stems, leaves, and flowers that have therapeutic qualities. However, the use of herbal remedies has increased with the development of synthetic medications. However, synthetic pharmaceuticals have yet to meet the standards set by herbal medicines in their quest for safety and effectiveness.

There have been tremendous increases in the use of herbal medicines in the recent times. It has been estimated that in the countries –developed as well as developing, the application of herbal plant extracts in the medicines is

about eighty percent of the total world population. It is regarded as one the primary health care measures for the treatment of various ailments especially in the developing countries.

There is a greater need for the greater manufacture of herbal goods as a result of the growing interest in herbal remedies. For a variety of reasons, herbal medicines are more in demand than synthetic ones.

- Lesser Side effects
- Better safety and efficacy
- Easily available
- Greater are for selection
- No requirement of animal testing

The most exposed area of the body is the skin, which is vulnerable to different external objects and can result in a number of skin-related conditions. Therefore, the most exposed portion of the body needs to be well cleaned and

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hygienic in order to prevent the spread of microorganisms throughout the environment and, consequently, prevent a variety of skin illnesses.

Using soaps is a better and more effective technique to get rid of all the dirt and unwanted particles. Not only does soap have antimicrobial qualities, it also aids in skin washing. Extracts incorporated in to the basic soap reaction. It is reported that herbal antimicrobial soaps have been reported to have about 60-80% of the property to inhibit the growth of micro- organisms.

Production 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. Another factor affecting the quality of soaps are:

- Colour of the soap
- Fragrance of the soap
- Moisturizing ability
- Compatibility of the skin
- Storage Stability.

Mentha oil botanically from the family Lamiaceae is obtained from the flowering leaves of Mentha piperita. This commonly called Peppermint is found in Europe and its cultivation is in almost all regions of the world. Mentha as an essential oil consists of methyl esters, alcohols, ocimene, terpenes, thujone, acetaldehyde, menthone, iso-menthone, sabinene as its chemical composition. This essential oil is said to have potent antibacterial activity against organism such as E. coli and it provides greater antioxidant property in the soap formulation. Mentha oil as volatile oil help in relaxation of mind as well as help in ameliorate the mood.

Plant Profile Neem Oil Botanical name of neem: Azadiracta indica

Fig.no.2

Plant typically used – leave

Colour- Green

Benefits of neem oil: Its lipids help dry skin stay hydrated and toned. For many years, organic soaps have contained neem extracts. It is perfect for everyday skincare and the treatment of skin disorders. Neem soap and shampoo are popular cosmetics because of their nourishing properties for the skin and scalp.

It is well known that neem products help irritated skin by reducing redness and irritation. Neem soaps are a great way to moisturize and smooth up dry, cracked skin. Neem soap's cleaning qualities enable it to rapidly treat skin issues brought on by fungi, parasites, or infections.

Constituents: Flavonoids, alkaloids, azadirone, nimbin, nimbidin, terpenoids, steroids, margosicasid, vanillic acid, glycosides, B-sitosterol, nimbectin, kaempferol, quercursertin are present in neem leaf.

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Fig.no.3 Coconut oil

Benefits: coconut oil helps to produce a bar of soap that has excellent cleaning properties.

Constituents: fatty acids, Caprylic acid, Capric acid, Lauric acid, Myristic acid, Palmitic Acid, Stearic Acid, Oleic Acid, Linoleic Acid.

OLIVE OIL Botanical name of olive: Olea Europa

Fig.no.4 Olive oil

Benefits: Olive oil as a base ingredient due to its deeply moisturising and nourishing properties. Also be used as a pure body oil, hair treatment, or natural soap which can help to relieve dry skin and soften wrinkles.

Collection of Materials/Ingredients: -

Neem oil, Coconut oil, olive oil was purchased from the local market. Sodium hydroxide and Distilled water was obtained from our college. Following table represent the list of ingredients used for the formulation of Poly herbal soap.

For Neem Soap

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SR.NO	INGREDIENTS	QUANTITY
1	Dstilled water	32.92gm
2	Lye (sodium hydroxide)	14.72 gm
3.	Olive oil	70 gm
4.	Coconut Oil	25 gm
5.	Neem Oil	5 gm
6.	Neem Leaf	1
7.	Green Colour	2-3 drops

Herbal soap making process: -

The reaction between an alkali (like Sodium Hydroxide) and any neutral fatty acid is the basic saponification reaction. In this reaction neutral fatty acid used was coconut oil, olive oil and alkali used sodium hydroxide (lye).

Procedure for Neem Soap: -

a) Weighed amount of coconut oil, olive oil, neem oil was poured in a beaker.

b) In another beaker, prepare the basic saponification reaction by adding NaOH in distilled water.

c) Add the oil mixture in the solution of lye and mixed well with the help of magnetic stirrer without heating involving the cold process of soap formation.

d) Green colour added gradually with continue measurement of pH to achieve between 6 to 7. The soap mixture was then allowed to solidify and kept at room temperature

Fig.no.5 Neem soap

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EVALUATION PARAMETERS

pH of the Poly herbal soap:- Ten grams of soap were dissolved in 100 milliliters of distilled water to create a 10% soap solution. A pH meter was used to measure the pH. After adding an electrode to the solution, the pH was recorded.

Colour and clarity characterization:- To determine the soap's color and assess the purity of the Polyherbal soap formulation, the soap was seen against a white backdrop. Capacity to create foam: About 1.0 grams of polyherbal soap were obtained and dissolved in 50 milliliters of distilled water in a 100 milliliter graduated measuring cylinder to test the soap's capacity to produce foam. After being shook for two to three minutes, the measuring cylinder was let to stand for ten minutes. After ten minutes, the height of the foam was measured. After three consecutive experiments, the observations were recorded, and the mean was calculated.

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 5-10 minutes.

Saponification value determination:- How many milligrams of potassium hydroxide are needed to completely saponify one gram of fat or oil? It can be defined as the average molecular weight of the fatty acid found in fat or oil. About 2 grams of the soap sample were placed in a conical flask, and 0.5M KOH solution was added in order to determine the saponification value. On a hot water bath, this mixture was cooked to roughly 55 degrees Celsius while being constantly stirred. After then, the temperature was raised to 100 degrees Celsius, and the boiling process lasted for around an hour. Using 0.5M HCl and phenolphthalein as an indicator, titration was carried out. The observed end point is the elimination of the pink colour.

Saponification is calculated as:

Saponification Value: Avg. Volume of KOH × 28.056 / Weight of oil (g)

Determination of TFM (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 of water (distilled).

It was dissolved by heating. Then this soap solution was 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 7 gm of bees wax and again heated. Cake formation takes place and it was removed and weighed.

% Total Fatty Matter = (A –X)/W x 100 where, X= weight of wax A= weight of wax+ oil

W= weight of soap

Antimicrobial testing of the given sample: The given sample of the soap was tested for its antimicrobial properties. By bore diffusion method. The micro-organism used were E. coli. In this method soap solution was prepared by dissolving 1 g of soap in distilled water. Various concentrations were produced such as 5, 10, 20, 50 mg/mL, the antibiotic used is Ciprofloxacin -

5µg. The plates were then kept for incubation for about 24 hours at a temperature of 37 ºC. Calculated the zone of inhibition (4)

EVALUATION OF SOAP

Sr. no.	Evaluation Parameter	For Neem Soap
1	PH	4
2	Colour	Green
3	Form Forming ability	15.0 ml
4	Retention Time of Foam	10-15 Minutes
5	Saponification value Determination	164.5 g/ml
6	Total fatty Matter	71 %

• Neem is a great component for skin care. Neem soap is well renowned for smoothing and relieving dry skin.

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• t has many antibacterial and antifungal qualities. It completely cleanses the skin of debris and pollutants while shielding it from bacteria. All skin types can use it.
• Because it is a handmade, natural product, there will inevitably be differences in colour and aroma.(6)

Result & discussion :-

The ideal pH range for the herbal formulation's use on the skin was 6.5 to 7, as both higher and lower pH values are associated with negative skin effects. The total fatty matter is a measure of the soap's quality. It is not ideal for dry skin if the total amount of fatty substance is reduced.

The more fatty matter there is, the more it helps to moisturize the skin. A saponification value of 164.5 g/m was discovered.

II. 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 chemicals. The pH between 6.5 to 7. Volunteers responded well and gave good feedback by using these poly herbal soaps. Soaps were found to be skin friendly. It was nice learning and a great achievement for our team to prepare the poly herbal soap with balanced pH. Furthermore, the prepared soap was evaluated by testing various physic-chemical properties such as pH appearance, colour, odour, antimicrobial, TFM in which they exhibit satisfactory effect.

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