



FORMULATION AND EVALUATION OF HERBAL NEEM SOAP

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ABSTRACT

The goal of this research is to create a herbal soap by using powdered *Azadirachta indica* (Neem) and *Ocimum tenuiflorum* (tulsi) extracts. With Ayurvedic cosmetics becoming more and more popular due to its natural ingredients this composition aims to incorporate botanical elements that are strongly ingrained in traditional medicine practices, with minimum adverse effects. Renowned for its therapeutic qualities, neem plays a significant role. It is notable for its anti-inflammatory, antihyperglycemic, antimalarial, and antibacterial qualities. The study employs a thorough methodology to investigate the effects of several Neem leaf extracts. The herbal soap is meticulously crafted, incorporating Neem and Tulsi, demonstrating specific efficacy against dermatophytes, while Tulsi showcases remarkable antiviral properties. This research serves to underscore the vast potential inherent in herbal formulations, shedding light on the manifold benefits of Neem and Tulsi and their transformative applications in skincare products.

Keywords-herbal neem soap

INTRODUCTION

SKIN:-

In addition to being the largest organ in the human body, the skin serves as the body's main line of defence. It functions as a internal organs, muscles, and bones are protected by this barrier from outside factors such dangerous viruses, temperature fluctuations, and physical trauma. Apart from its barrier role, the skin has a multitude of specialized cells and structures that play a vital role in controlling body temperature, generating vitamin D, and detecting touch, pressure, pain, and pleasure. Because of its intricacy and adaptability, the human skin is a unique organ that requires our consideration and care. Taking good care of our skin is essential to keeping it healthy and preventing a number of skin conditions. Our skin has a specific purpose in our body's general health, hence it merits our consideration and care. Skin disorders can impact individuals of all age groups, ranging from young infants to the elderly, and they can present in various forms. Among the frequent causes of skin problems include infections, allergies, overexposure to the sun, wounds, and more environmental variables. These elements may result in a variety of skin issues, including rashes, psoriasis, dermatitis, acne, eczema, and more. Here are some steps we may take to maintain healthy skin free from these problems. First and foremost, it's critical to maintain proper hygiene, which includes frequent washing and moisturizing. It's critical to utilize skincare products that are suitable for our skin type and mild. Furthermore, shielding our skin from damaging UV radiation when outdoors by donning sunscreen and protective clothes exposed to the sun is essential. Extended periods of sun exposure and sunburns can cause skin damage, which can have long-term consequences like early aging and a higher chance of developing skin cancer. It's also critical to stay away from triggers like specific chemicals,

materials, or foods that irritations. Overall skin healthy lifestyle that exercise, and enough dermatologist for medical medical problems or skin precise diagnosis, how to properly take care our skin is about



can result in allergic responses or health can be enhanced by leading a includes a balanced diet, consistent sleep. It is essential to consult a guidance if you have any persistent issues. They are able to offer a appropriate care, and direction on of our skin. Recall that caring for protecting the health and welfare of

our largest organ, not just how it looks. Thus, let's give skin health top priority and work hard to maintain it healthy, radiant, and free of disease. Although you may not typically think of the Skin as an organ, it is in fact made of tissues that Work together as a single structure to perform Unique and critical functions. The skin and its Accessory structures make up the integumentary System, which provides the body with overall Protection. The skin is made of multiple layers of Cells and tissues, which are held to underlying Structures by connective tissue. The deeper layer of Skin is well vascularized (has numerous blood Vessels). It also has numerous sensory, and Autonomic and sympathetic nerve fibers ensuring Communication to and from the brain⁴.

Skin is made up of following three layers-

1. Epidermis
2. Dermis
3. Subcutaneous (hypodermis)

TYPES OF SKIN:-

It's generally accepted that having skin that is well-hydrated and in the middle of the oily to dry spectrum is desirable. Nonetheless, dry skin is typically more of an issue than greasy skin. Xerosis, another name for dry skin, has a number of causes but is basically explained as follows. It is harsh to the touch, has a dull appearance (typically grey-white), and has more ridges.

There are numerous factors that either cause or regulate dry skin, such as the amount of lipids in the stratum corneum, aquaporin, sebum, and natural moisturizing factor. Because it keeps the skin hydrated, the stratum corneum (SC) is the most significant of these factors in the mechanism of xerosis. Ceramides, fatty acids, cholesterol, and other substances make up the SC.

These ingredients maintain the skin's water-tightness and protect it when they are harmonized properly. Primary cytokines stimulate keratinocyte lipid synthesis and proliferation, which maintains this equilibrium. An unbalance in these components causes a series of problems, such as a decreased ability to hold onto water and a heightened susceptibility to outside influences, which increases the sensitivity of the SC. The skin barrier is compromised, which leads to a rise in trans epidermal water loss (TEWL).

Dehydration prevents the enzymes required for desmosome metabolism; resulting in aberrant Coenocytes are shed. Moreover, a disruption in the lipid bilayer of the SC brought on by elevated fatty acid and lowered creamed levels are linked to dry skin. External elements such as UV light, detergents, acetone, chlorine, and prolonged exposure to water can also have an impact on this lipid bilayer. Extracellular proteases may be activated by pH variations in the area, which could have an impact on the cohesiveness and shedding of coenocytes from the SC. is essential for preserving the water content of skin cells. It is produced by lamellar bodies and discharged via the disintegration of the flagging protein. Lactic acid, urea, citrate, and sugars make up NMF, and they all bond to water molecules quite strongly. protease. Certain environmental variables including low humidity can impact the formation of NMF. Overall, obtaining and preserving well-hydrated skin requires a careful balancing act among multiple elements, such as appropriate lipid composition, skin barrier integrity, appropriate production of NMF, and AQP3 channels facilitate effective water transfer.

Skin condition

Fig.no.: 01 skin types & skin condition

SKIN CARE FOR THE OILY-DRY PARAMETER:-

Skin with normal levels and an intact stratum corneum (SC) and barrier can be classified as being in the centre of the oily-dry continuum. of aquaporin-3 (AQP3), natural moisturizing factor (NMF) and hyaluronic acid (HA), and balanced sebum secretion. OS, or oily skin, is the term used to describe acne-accompanied greasy skin. Skin with acne is frequently more sensitive. Benzoyl peroxide, antibiotics, retinoid, or other antimicrobials to eradicate or reduce skin germs are the mainstays of treatment for oily skin. Anti-inflammatory substances are also included in the mix. Treatment for oily skin without acne should focus on lowering sebum production, unless wrinkles and depigmentation are also present.. While retinoid and ketoconazole have demonstrated efficacy in decreasing sebum excretion, comparable outcomes have

not been noticed when using topical medications. Talc and sebum-absorbing polymers can also be used to mask sebum in OR (oily-resistant) skin. Dry skin that is exposed to the sun on a regular basis is probably going to have a compromised skin barrier and lower NMF.



Restoring the skin's protective layer and minimizing sun exposure with appropriate sun protection should be the main goals of therapy for this kind of skin. Harsh foaming detergents and prolonged bathing, especially in hot or chlorinated water, should be avoided by patients with xerosis (dry skin), as these can strip the skin of moisturizing lipids and NMF. When it comes to skincare, using moisturizers

two to three times a day and just after taking a bath or shower is suggested for people with extremely dry skin. Several over-the-counter (OTC) moisturizers are available that efficiently hydrate the skin in addition to pharmaceutical treatments. These consist of emollients, humectants, and occlusive. It's critical to understand the contents of these moisturizers because some of them can have allergies. Although "lanolin-free" moisturizers are getting increasingly popular, lanolin is still a prevalent ingredient. By lowering trans epidermal water loss (TEWL), occlusive agents offer short-term benefits; however, when the occlusive agent is withdrawn from the skin, TEWL resumes its original level. Humectants and occlusive are frequently used together to stop excessive TEWL and bacterial development. Propylene glycol (PG) is a colorless liquid that has keratolytic and antibacterial qualities that are frequently utilized as an occlusive and moisturizers include humectants. PG has been demonstrated to aid in the skin's absorption of specific medications and may trigger contact dermatitis by permitting allergens to pass through the epidermis.

In conclusion, using the proper moisturizer and adhering to skincare regimens can help keep skin hydrated and treat certain skin issues, such as dry or oily skin.

ORIGIN OF SOAP:-

The history of businesses that process soap extends back to prehistoric times. Although the precise invention of soap is yet unknown, there are several myths that relate to its origins. A common myth states that soap was found at

Rome's Sapon Hill in 1,000 B.C. A group of ladies are reported to have observed that when they cleaned their clothing at the foot of the slope, where soapy mud was dripping down from, their garments were becoming cleaner. a higher elevation where animal sacrifice had occurred (NASSAB, 2010). The women then discovered that this purifying material was created. The earliest known evidence of soap making, however, dates back even further, to around 2,800 B.C. Babylonian Clay cylinders from this period have been found containing a soap-like substance (India Soap Industry, 2011). Additionally, a tablet from ancient Babylonia, dating to approximately 2,200 B.C., provides further evidence of soap use. From these ancient beginnings, the art and knowledge of soap making spread across different regions and cultures, with soap making enterprises emerging in various parts of the world, each contributing unique techniques, ingredients, and formulations to the craft. Nowadays, the global soap processing industry is still thriving, with small-scale artisanal soap producers to substantial industrial producers. These businesses mix cutting-edge technology, contemporary ingredients, and creative manufacturing processes to provide a broad range of soaps that satisfy various customer demands and tastes.



Fig no.: 02 (soap)

HERBAL SOAP:-

We use soaps to wash our bodies and eliminate odours and grime. Plant parts including seeds, roots, and rhizomes are used to make herbal soaps, which contain inherent characteristics that have the ability to destroy microorganisms, prevent damage, delay aging, and maintain cleanliness. Unlike conventional soaps, these soaps are free of artificial colours, flavours, and other additives. Because they are safe, inexpensive, readily available, and effective, herbs are frequently utilized in skincare and medicine. to put to use. Aloe Vera is a plant that has long been used to improve our appearance and maintain our health. It's particularly well-liked in the beauty sector because it provides so many wonderful advantages for our bodies and skin.



Fig no.:03 (herbal soap)

NEEM (AZADIRACHTA INDICA):-

Azadirachta indica, the scientific name for neem, is a multipurpose tree of the Meliaceae Family. Its seeds, leaves, and bark are frequently utilized as a medical tool. The fruit, flower, and root may also have medicinal qualities in certain cases. The extensive array of uses of neem leaves is especially well-known. Leprosy, eye disorders, bloody noses, intestinal worms, upset stomachs, appetite loss, skin ulcers, cardiovascular illnesses, fever, diabetes, Surprisingly, neem leaves are even used to cause abortions and as a method of birth control. Neem, when administered topically, can successfully fight wounds, skin sores, head lice, and skin disorders. It also helps to soften the skin and acts as a natural insect repellent. Neem's insecticidal qualities are a noteworthy attribute that make it a well-liked option for a natural insecticide. All things considered, neem is an amazing plant with a wide range of uses in conventional medicine and other fields.

TABLE 1: IMPORTANT USES OF VARIOUS PARTS OF NEEM TREE:-

Part	Medical uses
Leaf	Leprosy, eye problem, skin ulcer, worms.
Bark	Analgesic, alternative and curative of fever.
Flower	Bile suppression and intestinal worms.
Twing	Relieves cough, asthma, piles, phantom tumour and diabetes.
Gum	Effective against skin disease like ringworm, scabies, wound and ulcers.
Seed pulp	Leprosy and intestinal worm.

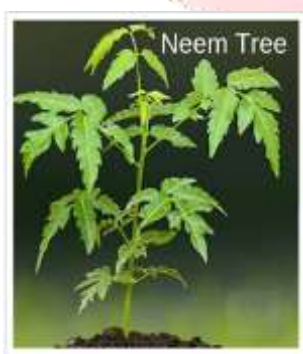


Fig no.:04 (Neem plant & its parts)

The neem tree is a fast-growing tree that can always stay green. It is found in India, Africa, and America. People have been using it in medicine for thousands of years because it has special healing properties. In the Sanskrit language, neem is called 'arista,' which means it is perfect and never gets destroyed. Another name for neem is 'Arishttha,' which means it helps relieve sickness. Because of its amazing qualities, the neem tree is considered very important, even by the US National Academy of Sciences. They wrote a report in 1992 that said neem is a tree that can help solve problems all over the world.

HISTORICAL SIGNIFICANCE OF NEEM:-

The neem tree's history, which stretches back thousands of years, emphasizes how vital it is to human survival. In the prehistoric Siddha Neem, sometimes called margosa, was the first plant mentioned in a therapeutic system. It was thought to ward off evil spirits and was used as a disinfectant against extremely contagious diseases like smallpox. In the ancient medical system, prescriptions and uses were noted on palm leaves, which helped to preserve the knowledge for future generations. Neem trees have been used for medicinal purposes since the Indus civilization 4500 years ago, notably during the Harappa period. Records from that era reference the numerous health benefits of neem, encompassing its fruits, seeds, oils, leaves, and more. bark as well as roots. India has a long tradition of writing on palm leaf manuscripts as a way to preserve information and record the history of its herbal legacy. The many parts of the neem tree have been found to have therapeutic properties by the Centre for Traditional Medicine and Research in Chennai, India. Neem leaves, for instance, can prevent and treat ulcers; neem bark helps treat conditions of the central nervous system and paralysis; neem flowers are used to treat bile issues. Neem is an important medicinal herb that is not limited to India. Neem was highly valued in the ancient Harappan and Mohenjo-Daro societies, according to evidence

prized for its therapeutic qualities. Neem oil was used to cure elephant and horse wounds by Nakul and Sahadeva, according to the epic Mahabharata. Since its inception, the neem tree has been used extensively in traditional medicine and is still valued for its ability to cure ailments today.

PHYTOCHEMICAL STUDIES AND BIOLOGICALLY ACTIVE

CHEMICAL CONSTITUENTS OF NEEM:-

Researchers have discovered approximately 140 distinct chemicals in the neem tree since it was first discovered in 1942. These substances can be separated into Isoprenoids and non-isoprenoids are the two groupings. Diterpenoids and triterpenoids are examples of isoprenoids, whereas proteins, amino acids, carbohydrates, and other compounds are examples of non-isoprenoids. Neem contains several chemicals, however only a few number have been well investigated for their impact on organisms. For instance, neem oil functions well as a natural insecticide due to the insect-killing properties of nimbin and azadirachtin.

Certain constituents in neem have anti-inflammatory and anti-cancer qualities, while gedunin and its derivatives have demonstrated promise in the treatment of malaria. Neem's proteins, amino acids, carbohydrates, and other constituents have therapeutic properties as well, such as the ability to combat inflammation and oxidation. While neem's chemicals and effects have been reviewed before, this review will concentrate on a few key compounds and their biological activity.

The compounds are displayed in Scheme 1.

BIOLOGICAL ACTIVITY OF NEEM CHEMICAL CONSTITUENTS:-

- **Antioxidant effect:-** Reactive oxygen species (ROS), also known as free radicals, have the ability to inflame and harm bodily cells. Oxidative stress may result from this, which may lead to a number of illnesses. Antioxidants are essential for preventing this because they assist our bodies counteract these dangerous radicals.



fig no.:05 (chemical compound of neem)

Neem, a naturally occurring plant extract, is one possible source of antioxidants. We can incorporate neem extracts into our diet by adding teas and oils. anti-oxidants. While research on the efficacy and safety of neem extracts is

ongoing, several conventional preparations are widely regarded as safe for use. Research has indicated that neem extracts possess potential antioxidant properties. For instance, neem extract decreased inflammatory indicators and raised glutathione levels, a protective enzyme, in rats who had intestinal damage. This implies that neem extract may strengthen our bodies' built-in defense systems. Rats suffering from colitis, or inflammation of

Neem extract was used as a treatment for the colon. In the colon, the extract decreased inflammation and tissue damage while increasing the amounts of antioxidant enzymes. This suggests that neem extract may enhance our body's defences against oxidative stress. Furthermore, it has been discovered that neem-enriched yogurts contain more antioxidants than ordinary yogurt. These fortified yogurts demonstrated increased antioxidant power and the capacity to block molecules linked to conditions like diabetes and high blood pressure. To sum up, Neem extracts may be advantageous antioxidants that help bolster our bodies' built-in defenses against oxidative damage. To completely comprehend their efficacy and guarantee their safety, more research is necessary.

- **Antiulcer Effects:-**

It has been demonstrated that neem leaf extract significantly reduces inflammation and secretion in rats. It lowers acidity levels, ulcer index, and the amount of gastric secretion at 80 and 160 mg/kg of medication. Nimbidin, a bitter chemical derived from neem, was shown in a clinical research to be beneficial in mending duodenal ulcers and alleviating discomfort in the epigastric area. Stearic and palmitic acids found in neem oil's nimbidin fraction are thought to have a role in the plant's ability to cure ulcers. Neem bark aqueous extract has strong antacid secretory and antiulcer properties; the bioactive ingredient identified is a glycoside. The medication "Bhunimbadi Ghanasar," which efficiently cures acid dyspeptic illness symptoms without any known adverse effects, contains neem as one of its constituents. Comprises nimbidin as its primary active ingredient. It has a strong potential to treat ulcers without causing any noticeable negative effects. Salanin, a limnoid Neem seed oil's bitter component has also been shown to have ulcer-healing properties. In experimental animals, it guards against stomach ulcers brought on by aspirin. The possibility of neem bark extract as a medicinal treatment for managing ulcers and stomach hyperacidity has been investigated. It has antioxidant qualities and prevents acid secretion and ulcer formation brought on by a variety of stimuli. The phenolic glycoside content of neem bark extract is responsible for its pharmacological actions. Neem extract shown to be well-tolerated in animal trials at dosages lower than the noted LD50, whether given orally over a period of 15 days or as a single dose. It also showed no significant adverse effects in rats. Overall, neem and its various extract show promising potential in the treatment of ulcers and related gastrointestinal conditions

- **Antimalarial Activity**

It has been discovered that neem possesses antimalarial properties. Neem seed extracts have been investigated for their impact on the formation and growth of the Plasmodium falciparum malaria parasite in humans, both in vitro and in vivo. The results of these extracts were really significant. It's interesting to note that neem components have an antimalarial impact even on parasites that have previously shown resistance to other antimalarial medications like pyrimethamine and chloroquine. This implies that neem's mechanism of action against malaria might be distinct. Neem seed fractions target both the parasite stages responsible for the disease's on-going transmission as well as the ones that cause the clinical presentation of malaria. Certain limonoid substances, including nimbadiol, meldenin, isomeldnin, and nimocinol, were separated from the Fresh neem leaf ethanolic extract has shown antimalarial efficacy against Plasmodium falciparum isolates resistant to chloroquine. These results demonstrate the promise of neem as a safe, natural substitute for antimalarial medications in the treatment of malaria, particularly when the parasite has become resistant to these medications.

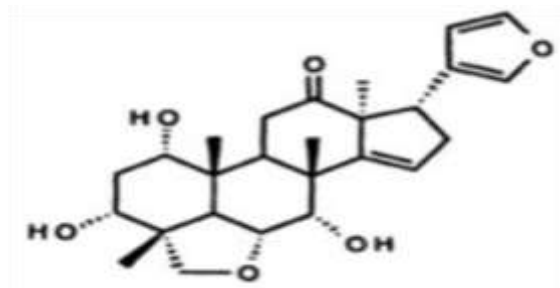
- **Anti-cancer Effect:-**

Neem bark, leaves, seeds, and seed oil include a variety of chemical components that have demonstrated effective tumor and cancer reduction without producing adverse effects. These substances, which include steroids, limonoids, terpenoids, and polysaccharides, have been widely employed to treat a variety of cancers. Neem extracts has anti-tumor effects that stem from their immunomodulatory and apoptotic activities. These actions impact the molecular mechanisms and modes of action of various tumor and cancer types, aiding in their prevention, protection, and suppression.

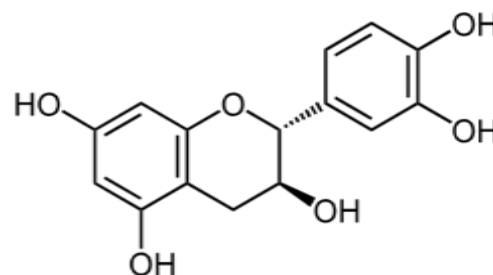
Research has shown that the active ingredients in neem detoxify carcinogens in hepatic tissues and have been shown to be helpful in preventing cutaneous papillomagenesis and forestomach cancer in mice. Neem extracts have also

- **Chemical Constituents Structure**





Nimbidin



catechin

Table 2: Chemical constituents present in neem:-

Chemical constituents	Properties and uses
Azadirachtin	Natural insecticide and repellent
Nimbin	Exhibits anti-inflammatory and analgesic properties
Quercetin	Antioxidant and antiinflammatory effects.
Beta-sitosterol	Supports heart health and may have anti-cancer properties.
Margosic acid	Antibacterial and antifungal activity
Nimbidin	Anti-inflammatory and analgesic properties
Salannin	Natural insecticidal properties
Gedunin	Exhibits antimalarial effects

The plant neem has been used extensively in homeopathic, Unani, and Ayurvedic medicine. It has also attracted a lot of interest in contemporary medication. All components of the neem tree, including the leaves, blossoms, seeds, roots, and bark, have been utilized as cures for a variety of human illnesses in traditional medicine. Neem leaves are highly prized and frequently utilized in traditional medical formulations because they are readily available throughout the year and are simple to extract compounds from. Neem leaves have several therapeutic use and a wide variety of pharmacological actions. This conversation will center on specifically on the pharmacological activities associated with neem leaves.

Neem role on skin health

Since acne is frequently linked to inadequate cleanliness, acne vulgaris sufferers should adhere to a suitable cleansing schedule. Using a soft and delicate Cleansers containing herbal compounds are an efficient way to get rid of dead skin cells, sebum, bacteria, and grime without making the skin feel dry. One herbal soap produced with turmeric and neem is intended to treat common skin issues on the face. This soap makes use of these plants' health benefits to lessen and prevent acne. Research has been done to assess this herbal soap's safety and effectiveness in preventing and treating both inflammatory and non-inflammatory acne lesions. The intention is to increase customer confidence in this promising product's efficacy. Alkaline pH soap compositions can deplete the skin of its natural lipids and irritate it, particularly in people who have a tendency for seborrhea or acne vulgaris, or dry skin. Thus, for such people, it is

advised to utilize low pH washing systems, including herbal soaps. Herbal soaps that contain a blend of several natural components can effectively eliminate filth and grime while yet being kind and sensitive to the skin. One of the active ingredients in the herbal soap mentioned, neem, is well-known for having anti-inflammatory and antibacterial qualities that can help minimize acne and enhance skin health in general.

Plant Profile

Contents of the Soap

- Neem:-



Fig no. 05 (Neem leaves)

- Botanical Name: *Azadiracta indica*
- Part Typically Used: Leaves
- Colour: Green
- Description: The leaves of *Azadiracta indica* are compound and alternate in arrangement. The rachis measures around 15-25cm in length and is approximately 0.1cm thick. Each leaflet is oblique, serrate, and measures about 7-8.5cm in length and 1-1.7cm in width. The color of the leaflets is slightly yellowish green.
- Constituents: Neem leaves contain various constituents such as flavonoids, alkaloids, azadirone, nimbin, nimbidin, terpenoids, steroids, margosic acid, vanillic acid, glycosides, B-sitosterol, nimbectin, kaempferol, and quercetin.

Material and methodology

- Material
- Collection of plant material:-

The local area of Shrirampur was used to gather the leaves of Tulsi (*Ocimum sanctum*) and Neem (*Azadiracta indica*). The foliage was painstakingly For the investigations, the material was sun dried, finely ground, and then kept in sealed vials. The leaves' natural characteristics can be preserved by sun drying, guaranteeing their integrity for use in research and other applications down the road.

Material Use:-

Neem and Tulsi plant materials are commonly used for their medicinal properties, natural pest control, skincare and haircare products, and in Indian cuisine. Tulsi is also considered sacred and used for religious and spiritual purposes.

- Methodology

Extract preparation involves grounding the leaves of *Ocimum tenuiflorum*, or *Azadiricta indica*, into apowder. Within the Soxhlet Orange peel is extracted using an instrument, and the dried and powdered peel is put within an extraction chamber in a thimble. A appropriate solvent is added to the flask below, such as acetone.

The solvent rises to the condenser as it evaporates, condenses, and then falls back down onto the orange peel powder. The targeted components can be effectively extracted from the peel thanks to this ongoing cycle. Following a given time frame, the solvent is collected in the flask, leaving behind the extracted essence of orange peel in the thimble.

FORMULATION AND EVALUATION OF HERBAL SOAP

Table 1

Chemical	Source
Beeswax	Laboratory reagent
Sodium lauryl sulphate	Laboratory reagent

Table 2

Herbal Plant	Source
Neem	Plant
Tulsi	Plant
Orange oil	Plant

Table 3:- Morphological characters of ingredients

Sr. No	Ingredients	Color	Oduor	Taste
1	Beeswax	Yellowish	HoneyLike	Waxy
2	Neem Leaves	Green	Bitter	Bitter
3	Tulsi Leaves	Green	Bitter	Bitter
4	Sodium lauryl sulphate	Orange	Odorless	-
5	Orange oil	Orange	-	-

FORMULA [1]:

The formula shown in Table 3 is best suited for the preparation of herbal soaps.

Table 3:- Formula for preparation of soap

Sr.no.	Ingredients	Quantity	Use
1	Beeswax	(%)	Hardening
2	Neem powder	20gm	Antibacterial
3	Tulsi	20gm	Antiviral
4	Sodium	10gm	Cleansing and foaming
5	lauryl sulphate	15gm	Perfume

PREPARATION OF HERBAL NEEM SOAP:-

To formulate a herbal neem soap, the following ingredients will be used:

- Neem powder: 20gm
- Tulsi powder: 10gm
- Beeswax: 20gm
- Sodium lauryl sulfate: 15gm
- Orange oil
- The formulation process involves these steps:
 1. Weigh out 20gm of neem powder and 10gm of tulsi powder.
 2. In a double boiler, melt 20gm of beeswax over low heat until it becomes liquid.
 3. Gradually add the neem powder and tulsi powder to the melted beeswax, stirring continuously to ensure they are fully incorporated.
 4. Once the powders are well mixed, add 15gm of sodium lauryl sulphate to the mixture. The addition of sodium lauryl sulphate helps create lather in the soap.
 5. Stir the mixture well to combine all the ingredients thoroughly.
 6. Remove the mixture from heat and allow it to cool slightly.
 7. As the mixture cools, add a few drops of orange oil for fragrance. Adjust the amount according to your preference, but be careful not to make the scent overpowering.
 8. Pour the semi-solid soap mixture into soap molds or any desired container.
 9. Allow the soap to cool and solidify completely before removing it from the molds.
 10. Once the soap has hardened, gently press on the back of the molds or slightly twist them to release the soap bars from the molds.
 11. Place the finished neem soap bars on a drying rack or any well-ventilated area to cure and harden further. This helps to improve the longevity and quality of the soap.
 12. Allow the soap bars to cure for at least 4-6 weeks before using. During this curing period, the soap will gradually lose excess moisture and become harder, resulting in a longer lasting bar

Phytochemical Test:-

☐ Phytochemical Test for Saponins [Soapnut]:

- Take 5 ml of the solvent extract in a test tube.
- Add a few drops of sodium bicarbonate to the test tube.
- Shake the test tube vigorously and let it stand for 3 minutes.
- The development of a cloudy white precipitate indicates the presence of saponins.

☐ Phytochemical Test for Triterpenoids [Lavender Oil]:

- Add 2 ml of the solvent extract and 1 ml of CHCl_3 (chloroform) to a test tube.
- Shake the test tube gently.
- Add 1 ml of acetic anhydride to the test tube.
- Add 1 ml of concentrated H_2SO_4 (sulfuric acid) along the sides of the test tube.
- The appearance of two junctions indicates the presence of triterpenoids.

☐ Phytochemical Test for Tannins [Coconut Oil]: -

- Take 1 ml of the solvent and dilute it with distilled water.
- Add 2 drops of ferric chloride to the solution.
- A cream gelatinous precipitate or a transient greenish to black color indicates the presence of tannins.

☐ Phytochemical Test for Glycosides:

- Dissolve 0.5 mg of the sample extract in 1 ml of water.
- Add aqueous NaOH solution to the solution.
- The formation of a yellow colour indicates the presence of glycosides.

☐ Phytochemical Test for Flavonoids:

- Take 1 ml of the sample solution in a test tube.
- Add a few drops of dilute NaOH solution to the test tube.
- An intense yellow color will appear in the test tube.
- The color will become colorless upon the addition of a few drops of dilute acid, indicating the presence of flavonoids.

☐ Phytochemical Test for Terpenoids:

- Perform the Salkowski test to detect terpenoids.
- Mix 5 ml of the extract with 2 ml of chloroform.
- Carefully add 3 ml of concentrated sulfuric acid to form a layer.
- A reddish-brown coloration at the interface indicates the presence of terpenoids.

☐ Phytochemical Test for Phenols:

- Add aqueous ferric chloride to the sample solution.
- Compounds with a phenol group will form a blue, violet, purple, green, or red-brown color upon addition of the ferric chloride.
- This reaction can be used as a test for the presence of phenol groups.

Table 4:- Phyto-chemical parameters

Sr.no.	Chemical constituents	Tulsi leaves	Neem leaves	Orange oil
1	Alkaloids	+	+	+
2	Glycosides	+	-	-
3	Tannins	+	+	+
4	Flavonoids	+	-	+
5	Terpenoids	+	+	+
6	Phenol	+	+	+
7	Saponins	+	+	+

EVALUATIONS

The herbal soap formulated was evaluated For the following:

☐ Organoleptic evaluation:-

- **Colour - Brown**
- **odour - Orange**
- **Appearance :-Good**

☐ Physical evaluation

• The herbal soap formulated was also evaluated for the following properties:

❖ pH Measurement: -

- Take 1 gram of soap sample and dissolve it in 10 ml of water.
- Test the pH of the soap solution using pH paper to determine its pH range.

❖ Foam Retention:

- Take 25 ml of 1% soap solution in a 100 ml measuring cylinder.
- cover the measuring cylinder with your hand and shake it vigorously for 10 minutes.
- Record the volume of foam at 1-minute intervals for a total of 4 minutes.

☐ Foam Height: -

- Take 0.5 grams of the soap sample and dissolve it in 25 ml of distilled water.
- Transfer the solution to a 100 ml measuring cylinder and make the volume up to 50 ml with water.
- Shake the measuring cylinder with the solution for 25 strokes and let it stand for a few minutes.

- Measure the height of the foam above the aqueous volume.
- ☐ Percentage of Free Alkali:
 - Take 5 grams of the soap sample and dissolve it in 50 ml of alcohol.
 - Boil the mixture for 30 minutes.
 - Titrate the solution with 0.1N HCl (hydrochloric acid) to determine the amount of free alkali present.
- ☐ Alcohol Insoluble Matter:
 - Take 5 grams of the soap sample in a conical flask.
 - Add 50 ml of warm ethanol and shake it until the soap completely dissolves.
 - Filter the solution with 20 ml warm ethanol and dry the filter paper at 105°C for 1 hour.
 - Note the weight of the dried filter paper.
- ☐ Total Fatty Matter (TFM): -
 - Take 10 grams of the soap sample in 150 ml of distilled water.
 - Add 20 ml of 15% H₂SO₄ (sulphuric acid) to the solution.
 - Solidify the solution by adding 7 grams of beeswax.
 - Heat the solution again to allow cake formation.
 - Remove the cake, let it dry, and weigh it to determine the TFM content.
- ☐ Moisture Content: -
 - Weigh the soap sample and dry it using a drier at a temperature range of 100 to 115°C.
 - Calculate the moisture content using the formula:
 - **Percentage Moisture Content = (Initial Weight - Final Weight) * 100**
- ☐ Saponification: -
 - Mix a sample with 25 ml of alcoholic solution of KOH (potassium hydroxide) and leave it to react for 1 hour in a steam bath.
 - Perform a back titration of the reacted solution with 0.5N sulphuric acid in the presence of phenolphthalein indicator to determine the saponification value.
- ☐ Foam Forming Ability:
 - Take 1.0 gram of soap sample and dissolve it in 50 ml of water in a 100 ml graduated measuring cylinder.
 - Shake the measuring cylinder vigorously for 2-3 minutes.
 - Allow the foam to settle for about 10 minutes.
 - Measure the height of the foam after 10 minutes.
 - Repeat the experiment 3 times and record the observations. Calculate the mean value.
- ☐ Skin Irritation Test:
 - Wash your skin properly and apply the soap sample on the skin.
 - Observe any signs of irritation, burning, itching, or other symptoms.

Table 5: Results of Evaluation of Soap

Evaluation Parameters	F1	F2	F3	F4	F5
Colour	Green	Green	Green	Green	Green
Odour	Fragrant	Fragrant	Fragrant	Fragrant	Fragrant
Shape	Heart	Round	Square	oval	Round
Texture	Smooth	Smooth	Smooth	Smooth	Smooth
PH	7.1	7.4	7.2	7	7.3

Moisture content	3.3	1.9	2.6	2.5	3.0
Foam height (cm)	2.0	2.2	2.5	2.7	2.9
Foam retention time (min)	3.1	3.7	3.2	3.3	3.4
Free alkali(%)	0.27	0.28	0.26	0.28	0.27
Alcohol insoluble matter	21	17	15	19	18
Viscosity (cp)	48	48	60	72	84
Skin irritation	Non-Irritant	Non-Irritant	Non-Irritant	Non-Irritant	Non-Irritant
Antimicrobial Study (mm)	5.0	6.1	6.5	7.2	7.6

❑ **Sebumeter:-**

- A device called a sebumeter is used to gauge how well skin and hair care products work.
- Sebum from any part of the skin can be objectively measured with a device called a sebumeter.
- Antonie Kawam is the inventor, and he filed for patent in 1992.
- Excessive dryness or oiliness has an impact on the skin's physical look.
- Therefore, determining one's oiliness is crucial to choosing the right routine for achieving cosmesis.

❑ **Probe for Sebumeter (Cassette):**

- A 64 mm measuring piece of the tape is visible via the cassette's measuring head.
- A trigger located at the side of the cassette moves the tape ahead for a measurement, exposing a new area of the tape.
- The cassette's used tape is rewound within. Approximately 450 measurements can be made with a single cassette.

- How much of the tape is still unused is shown on the trigger by the scale from 1-0. After it is empty, the cassette is simply replaced for hygiene reasons.
- Constant pressure on the skin is provided by a spring inside the measurement head. Its little weight facilitates handling.
- The accuracy of the device is $\pm 5\%$.
- Sebum readings can be shown as a number or as a skin type, such as oily, normal, normal/oily, dry, or normal/normal.

❑ Techniques for estimating sebum:-

- Lipids from human skin have been extracted and their production measured using a variety of techniques in the past.

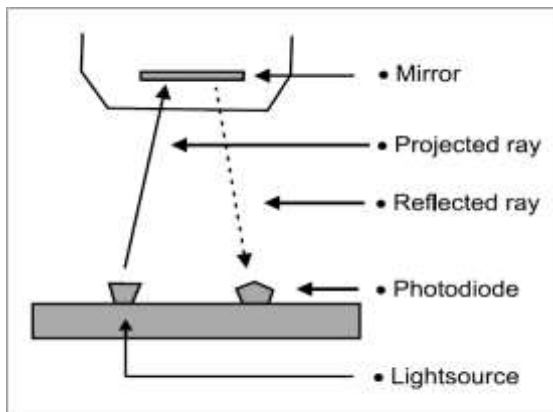


Figure 1: Optical diagram of sebumeter



- These consist of washing lipid solvents over skin regions delimited by rings or caps, and swabbing with pads dipped in organic solvents like hexane or ether.
- Strauss and Pochi developed a straightforward, repeatable, but labor-intensive technique for calculating sebum secretion in humans. After applying a pad of absorbent cigarette papers to a designated area of the forehead for three hours, they used diethyl ether to remove the sebum.
- The sebumeter, created by Antoine, provides a qualitative or quantitative assessment of the oiliness of the skin when applied to the skin.
- Normal, oily, and dry are the typical classifications for facial skin. Skin type, however, is not correlated with sebum secretion levels. As a result, basic and subjective classification has very little utility and needs to be reevaluated using a standardized, objective measurement instrument like the sebumeter.
- It is a tool that allows sebum to be objectively measured from any part of the skin.
- There are several kinds of equipment available to measure sebum production. They work on the premise that a translucent element, such as frosted glass or a plastic plate or strip, becomes more transparent when sebum is applied to it (the more sebum applied, the more transparency produced).
- A photoelectric receiver is then used to measure the amount of light that passes through this translucent element covered in sebum.
- Antoine created the sebumeter, a device that measures skin oiliness quantitatively or qualitatively when applied to the skin.

Fig no. 06 (Sebumeter)

❑ Mechanism of the sebumeter's sebum measuring :-

- Grease-spot photometry serves as the foundation for the measurement [Figure - 1]. The cassette's measuring head, together with its unique tape, is positioned against the skin. After that, it is placed into a slot on the apparatus, and a light source that shines through the tape measures its transparency. Transparency is measured by a photocell. The result, which is displayed on the display in mg sebum/cm² of skin, is computed by a microprocessor.

❑ Sebumeter probe (Cassette) :-

- There is a matt synthetic tape, 0.1 mm thick, in the Sebumeter cassette. A trigger at the side of the cassette moves the 64 mm² portion of tape that is exposed by the measuring head ahead for the subsequent measurement. A built-in clock in the device controls the 30-second measuring period. The measurement principle previously mentioned is then used to determine sebum. The precision of the device is within a 5% range. The sebum reading can be shown as a number or as a skin type, such as oily, normal, dry/normal, normal, or normal/oily.

❑ Uses of sebumeter:-

- To objectively categorize skin types as dry, normal, and oily
- To recommend medications and cosmetics that are appropriate for the patient's skin type in order to maximize effectiveness and reduce side effects
- Pre-placement testing for accurate skin type analysis in the field of occupational medicine; for example, a person with dry skin type might not be suited for employment in a chemical industry that uses acids and alkalis.
- To diagnose senile asteotosis as soon as possible.
- To gauge how well soaps clean the skin
- To do initial screening and monitor individuals with hyperandrogenic states.
- To investigate how women's sebaceous follicles are controlled by hormones in order to gauge hormonal aging
- To investigate the relationship between menstrual cycle, sebum secretion, and "bad hair days," which are days when most women find it difficult to maintain their hair.
- To research the sebo-suppressive effects of retinoic acid and other anti-acne drugs on acne vulgaris
- To investigate the activity of the sebaceous glands in diabetics, whose glandular activity is reduced

❑ Cons and advantages of sebumeter:-

- use Sebumeter is a fast and easy way to estimate sebum (less than a minute). It takes little training to utilize this small equipment. The instrument's price and that of the consumable, the tape, are the only drawbacks. Therefore, as the importance of skin improvement increases, sebumeters are expected to be a standard tool in dermatologists' offices.

Measuring

T amount of sebum secreted by the skin is another criterion used to assess the skin.

sebum

Sebum

is an oily substance made up of a combination of triglycerides, wax esters, cholesterol esters, and squalene that is

produced by the sebaceous glands of mammals.

Sebum travels upward down the hair shaft and then spreads across the skin after being produced by the sebaceous glands. It performs the subsequent duties: cuts down on water loss (TEWL), he Measuring sebum T amount of sebum secreted by the skin is another criterion used to assess the skin. Sebum

is an oily substance made up of a combination of triglycerides, wax esters, cholesterol esters, and squalene that is produced by the sebaceous glands of mammals.

Sebum travels upward down the hair shaft and then spreads across the skin after being produced by the sebaceous glands. It performs the subsequent duties: cuts down on water loss (TEWL), keeps germs from spreading and allergies from coming into touch [22]. A matt tape is put to the skin to measure the amount of sebum, and

For thirty seconds, it absorbs the sebum under a steady pressure of 10 N. The tape becomes transparent due to the oils absorbed from the skin when it is placed in the equipment for analysis. The measurement is based on optically measured sebum spot photometry.

❑ **Corneometer :-**

- The Corneometer measures the skin's dielectric characteristics to determine the degree of moisture in the stratum corneum, the outermost layer of skin. A probe is applied to the skin's surface to perform the measurements.
- measurement is the capacitance of a dielectric medium—in this example, skin. It measures the skin's dielectric constant using fringing field capacitance sensors. Skin's dielectric constant varies as its water content does.
- The stratum corneum's moisture content affects several aspects of skin, such as its mechanical qualities and barrier performance. Because of this, measuring hydration has become one of the most significant and widely applied metrics. Every hydration instrumentation is evaluated and compared against the best-selling hydration measurement equipment in the world, the Corneometer.
- In addition to offering temperature stability, the probe's superior electronics eliminate measurement interference caused by variations in the power supply and base capacity. A spring in the probe head maintains even pressure on the skin, allowing for precise and repeatable findings. All body sites may be measured easily because to the probe's low weight and compact measurement area (49 mm²).

- **MEASUREMENT** SECTION
The basis for the Corneometer® measurement is the capacitance of a dielectric medium—in this example, skin. It measures the skin's dielectric constant using fringing field capacitance sensors. Skin's dielectric constant varies as its water content does. This enables the precision measuring capacitor to detect any variations in skin moisture. These variations in the stratum Corneum's water content are translated into arbitrary hydration units. To make sure that only the capacitance changes as a result of the water content are detected, a little piece of glass is attached to the probe head. It is possible to detect even minute changes in water. With a measurement time of just one second, occlusion effects are minimized. The stratum Corneum, at a depth of 10–20 µm, is used for the measurement to ensure that the measurement is unaffected by deeper skin layers.

- **The Most Widely Used Skin Hydration Measurement Device in the World**
The most widely used technique for consistently and correctly determining the stratum corneum's (the skin's surface moisture level) has been available for more than 35 years thanks to Corneometer®. The many scientific publications that support this claim have made skin hydration measurements and "corneometry" synonymous. The Corneometer® standard is constantly used to evaluate the accuracy of different hydration measurement devices available on the market.

❑ **Advantages of the Corneometer®:-**

- The probe's lightning-fast measurement (1 s) is crucial for preventing occlusion.
- It is optional to carry out continuous measurements for a longer duration ("dynamic occlusion").
- Due to capacitance measurement, substances on the skin (such as salts or leftovers from topical applications) have very little effect.

- To exclude the impact of deeper skin layers, such as blood vessels, the measuring depth is very short (10–20 µm of the stratum corneum).
- The probe's compact size and low weight make it simple to handle and measure on any part of the body, even the lips.
- Precise and repeatable measurements are made possible by the probe head's spring, which maintains consistent pressure on the skin.
- It is simple to evaluate the penetration depth of the scatter field and the accuracy of the Corneometer® probe at any moment.
- Each measurement can be followed by a fast cleaning of the probe head.
- Recognized globally as "corneometry" with an extensive body of research. Astronauts on board the International Space Station (ISS) had their skin conditions assessed using the Corneometer®.*
- According to the most recent recommendations from the experts at EEMCO (the European group on efficacy measurement and assessment of cosmetics and other goods), the Corneometer® is specifically advised for skin water measurements (Skin Research & Technology, 2018, 24, p. 351-358).
- Anytime, anyplace, one may simply verify the penetration depth of the scatter field and the accuracy of the Corneometer® probe.

RESULTS:

1. Neem powder's well-known antibacterial qualities enable it to successfully fight both bacteria and fungus. Fungus and bacteria on the skin. This means that those who are prone to acne, skin infections, and other microbial-related problems can use the herbal neem soap. The inclusion of neem powder in the soap recipe improves its ability to destroy pathogenic bacteria and stop the growth of fungi.
2. Nourishing and Moisturizing: The soap's beeswax content helps to keep the skin hydrated and seal in moisture. As a naturally occurring emollient, beeswax creates a barrier of protection across the skin's surface. This barrier has a nourishing effect by keeping the skin hydrated and preventing water loss. Frequent application of the herbal neem soap preserves the skin's natural balance and helps avoid extreme dryness.
3. Lathering and Cleaning: A popular surfactant in soaps, sodium lauryl sulphate, produces a thick, foamy lather when mixed with a liquid. The skin is left feeling clean and revitalized as a result of the lathering action's assistance in removing debris, oil, and pollutants. The sodium lauryl sulphate in the herbal neem soap effectively washes the skin without irritating or drying it out.
4. Healing and Soothing: Holy basil leaves are the source of tulsi powder, which has calming and healing qualities. It soothes inflamed skin. Lessen redness and encourage smaller cuts, wounds, and rashes to heal more quickly. For those with sensitive or inflammatory skin issues, the herbal neem soap with tulsi powder infusion offers a mild and calming sensation for the skin.
5. Aromatic Experience: Orange oil, derived from orange peel, provides a delightful fragrance to the soap. Its pleasant citrus aroma adds to the overall sensory experience of using the herbal neem soap. In addition, orange oil contains antioxidants that help protect the skin from environmental damage and promote a healthy complexion.

DISCUSSION:

- The herbal neem soap's blend of neem powder, sodium lauryl sulphate, beeswax, orange oil, and tulsi powder exhibits a synergistic result in offering the skin a number of advantages. With its antibacterial, antifungal, moisturizing, cleaning, healing, and fragrant qualities, the soap is a multipurpose, all-encompassing skincare treatment. The optimal concentrations of each ingredient can be studied through additional research to optimize the recipe. This will optimize the soap's positive skin-benefit benefits while guaranteeing its effectiveness and safety. Additionally, user feedback and extensive testing across different skin types will provide valuable information about the effectiveness, possible negative effects, and general acceptability of the soap. Additionally, long-term research might be done to assess the continued use of the herbal neem soap and its effects on numerous skin issues. This will assist in determining whether or not it is appropriate for certain skin types, such as sensitive, dry, or acne-prone skin.

CONCLUSION

creation of a natural neem soap with sodium lauryl, neem powder, and Sulfate, orange oil, beeswax, and tulsi powder exhibit encouraging outcomes in terms of their antimicrobial, moisturizing, cleaning, restorative, and aromatic qualities. Through extensive testing, concentration optimization, and formulation refining, the herbal neem soap has the potential to develop into a very advantageous and popular natural skincare product.

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