

# FORMULATION AND EVALUATION OF ANTI ACNE FACE WASH WITH THE HELP OF NEEM EXTRACT

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## ABSTRACT :

The natural medicines are safer and have fewer negative effects than synthetic ones makes them more widely accepted. The global market for herbal formulations is expanding aqueous extracts of neem leaves (*azadirachta indica*), turmeric (*curcuma longa*), liquorice root, shahi jeera, orange peel, and hydroalcoholic extract of nutmeg fruit (*myristica aroma*) are all included in this study's formulation and assessment of a herbal anti-acne face wash. While there are a number of topical herbal acne formulations on the market, we suggest creating a pure herbal formulation devoid of any artificial ingredients. Literature has indicated that the plants have strong antimicrobial, antioxidant, and Anti-Inflammatory Properties.(1) The skin on our face is delicate, and regular soaps can dehydrate and damage its texture. A face wash is a gentle cleanser that works without causing any harsh effects on the skin. The goal of face wash is to provide cleansing, prevent wrinkles, combat acne, hydrate the skin, and improve its fairness, resulting in a youthful and vibrant appearance. Currently, face washes on the market come in gel and cream forms, which are often packaged in large collapsible tubes or plastic containers, making them inconvenient for travelers. Additionally, since these face washes are primarily water-based, they require preservatives to ensure their stability. This current study aims to address the limitations associated with synthetic face washes. Many peoples are worried about acne, pimples, and cystic acne, which are common issues faced by teenagers and adults due to their everyday activities. To maintain clear skin, it is important to follow a skincare regimen that includes a face wash, scrub, and moisturizer. Although chemical-based products have been widely used by people globally for an extended period, they have demonstrated various negative side effects. In contrast, herbal remedies have been used in India for centuries and have not been known to cause any significant adverse effects(3) Acne is a long-lasting inflammatory condition of the pilocebaseous unit that is characterized by heightened sebum production from the sebaceous glands and irregular shedding of hair follicles, triggered by rising androgen levels during puberty. The obstruction of hair follicles leads to their enlargement, often accompanied by an increase in the bacteria *Propionibacterium acnes* and the initiation of an inflammatory response.

**KEYWORDS :** neem, herbal ingredients,acne,anti acne face wash,propionibacterium

## INTRODUCTION :

### Acne and acne types :

Acne vulgaris is a widely prevalent skin condition (pilocebaseous unit) that impacts nearly everyone at least once in their lifetime. Although the highest incidence of acne occurs during adolescence, many men and women in their 20s and 30s also experience this condition Acne can be categorized into comedonal, papular, pustular, cystic, and nodular types Comedonal acne is not inflammatory and can be divided into two types: whiteheads and blackheads. Whiteheads (closed comedo) appear as newly formed or white-colored raised bumps, while blackheads (open comedo) show as open pores filled with dark-colored skin debris made up of melanin, sebum,

and follicular cells. Papules are characterized by red, solid, raised lesions that are usually under 5mm in diameter. Pustules are defined as localized skin elevations that contain pus. Cysts and nodules are solid, raised lesions that penetrate deeper into the dermal and subcutaneous layers. Cysts measure less than 5mm, while nodules are larger than 5mm. The development of acne is influenced by various physiological factors. These factors consist of increased growth within the hair follicles, enhanced sebum production linked to elevated androgen levels, and the presence of microorganisms like *Propionibacterium acnes* and *Staphylococcus epidermidis*. Recent concepts have surfaced to provide a deeper understanding of its development, which includes variations in sensitivity of target cells, biological indicators, neuro-endocrine influences, genetic predispositions, and environmental factors. Numerous natural and synthetic components are documented to have significant positive effects on acne vulgaris.

#### **They may operate through different mechanisms such as follows :**

- a) Regulate the production of sebum.
- b) Antibiotics that inhibit *Propionibacterium acnes* and *Staphylococcus epidermidis*, the primary bacteria responsible for acne.
- c) Keratolytic agents remove the outer layer of keratin and help stop sebum from getting stuck under the skin.
- d) Anti-inflammatory treatments that reduce the progression of the condition caused by inflammation or redness. (1)

#### **Cosmetics:**

According to the Drug and Cosmetics Act of 190 and the accompanying rules established in 1945, 'cosmetic' is defined as any product designed to be applied to the human body or any part of it through rubbing, pouring, sprinkling, or spreading, with the intention of cleansing, beautifying, enhancing attractiveness, or changing appearance. This definition also encompasses any product intended to serve as a component of cosmetics. Cosmetics consist of a mix of chemical compounds that come from natural sources or are made in labs.

#### **Herbal cosmetics :**

Herbal cosmetics are beauty products that have beneficial effects on the body. They help with things like healing the skin, making it smooth, improving appearance, and conditioning, all thanks to the use of herbal ingredients. The cosmetics which are prepared using Plant products have cosmetic actions. Recently the Increased use of herbal in cosmetics is mainly due To their mild and non-toxic nature.. Plant-based ingredients and natural supplements are commonly found in cosmetics. Natural products include oils, extracts, secretion, Etc. phytoingredients include pure constituents Obtained by various process.(6)

#### **Advantages :**

- They either have minimal side effects or none at all, and they effectively help to eliminate skin damage and dryness completely.
- The herbal facial cleanser Is very effective for combating skin irritation.
- They do not contain any harmful or synthetic additives.
- They also deliver nutrients suitable for all skin types.

**Disadvantages :**

- In addition to having dyes and fragrances that may irritate the skin and worsen acne.
- Occasionally, they can be too aggressive, resulting in excessive skin dryness, which causes the oil glands to compensate and ultimately produce more oil on the skin's surface.

**Anti acne face wash :**

Acne is a skin infection resulting from changes in the sebaceous glands. The most prevalent type of acne is known as acne vulgaris. Acne vulgaris is a widespread skin issue that many individuals experience. The redness happens because the skin gets inflamed in reaction to the infection. Oils produced by the glands mix with dead skin cells, leading to blockages in hair follicles. When a pore becomes blocked, oil accumulates, allowing skin bacteria to multiply rapidly. This infection causes the skin to become swollen and red, making it easily noticeable. Acne commonly appears on the face, chest, back, and upper arms.

Acne can be categorized into comedonal, papular, pustular, cystic, and nodular types.

The word acne comes from the Greek word "acme," meaning "the peak of life." Generally, acne is seen as a harmless condition that goes away on its own, but it can cause serious emotional problems that might last for a long time. This condition is known as a polymorphic disorder and can show up at any age. However, it usually appears in people between the ages of 12 and 24, with around 85% of cases occurring in that range. The population affected.(6)(3).

**Various types of acne :****Acne Rosacea:**

This condition makes the face turn red and often leads to small, red bumps filled with pus. Rosacea mainly impacts middle-aged women and can be mistaken for acne or other skin problems.

In this condition, the blood vessels in the face dilate, resulting in a flushed appearance. Rosacea is a chronic and incurable skin disorder resembling adult acne, but it can be effectively managed and treated medically. Symptoms can be intermittent, with skin remaining clear for varying periods of weeks, months, or even years, before reappearing. Rosacea usually moves through specific stages and causes inflammation on the skin of the face, especially on the forehead, cheeks, nose, and chin.

The signs and symptoms of Rosacea include facial redness, small red pimples, and fine red lines on the skin, along with a swollen, bulbous red nose and ocular issues such as swollen, red eyelids and conjunctivitis.

**Acne Vulgaris**

It is the most prevalent type of acne. It features seborrhea, comedones, nodules, pustules, papules, and cysts. This condition typically develops in skin regions with high sebaceous gland activity, including the upper chest, back, legs, and face, where the glands become clogged and infected. It commonly affects individuals from

puberty through young adulthood. Acne can manifest on any part of the body, but it is most often seen on the face, neck, chest, shoulders, and back. If you have acne, it may present as red and white bumps or pimples accompanied by inflamed skin. Both blackheads and whiteheads are referred to as comedones. Blackheads are typically visible on the skin's surface and have a dark appearance, while whiteheads are located just beneath the skin's surface, appearing white. Blackheads are the most recognizable form of acne, though other types of lesions can also develop.(5)

### **Acne can typically be classified into six main types:**

- 1) Whiteheads (non-inflammatory): This kind of acne happens when closed pores get blocked with bacteria, oil, or dead skin cells. They usually don't hurt.
- 2) Blackheads (non-inflammatory) – This category of acne is painless and emerges in open pores that are blocked with impurities like dirt or excess sebum from sebaceous glands.
- 3) Papules (Inflammatory) – This type occurs when the impurities clogging the pores cause inflammation in hair follicles; it does not present with visible pus.
- 4) Pustules (Inflammatory) – This is the subsequent stage of papules, where acne manifests as visible pus-filled blisters and may lead to pain in the affected region.
- 5) Nodules (Inflammatory) – This form of acne is painful, characterized by lesions that are situated deep beneath the skin and appear as red bumps, taking several weeks to heal.
- 6) Cystic Lesions (Inflammatory) – Cystic acne is a more persistent variant of nodular acne, deeply ingrained in the skin and damaging the underlying layers. It is the most painful type of acne, which should not be overlooked.

### **Benefits of anti acne face wash :**

- Maintains a refreshed appearance by regulating excessive oil production
- Reduces blackheads and acne while aiding in scar lightening
- Removes dirt and other unwanted substances from deep inside the pores.
- With consistent use, anticipate a more radiant and brighter complexion
- Moisturizes and revitalizes dull, fatigued skin
- Free from harmful chemicals
- Contains no mineral oil
- Suitable for both males and females (1).

**Plant/ drug profile :**

Sr. no.	Ingredients	Uses
1.	Neem leaves (Azadirachta indica)	It fights bacteria, fungus, and inflammation, acts as a disinfectant, and is very helpful for oily and acne-prone skin.
2.	Turmeric (curcuma)	It fights bacteria and fungi, protects the skin from various infections, and also gives the face a nice glow.
3.	Nutmeg seed	Antibacterial, anti-inflammatory, antiseptic, bactericide.
4.	Liquorice root	Provides the skin with helpful calming effects. It is known for its strong ability to refresh and nourish.
5.	Honey	Light moisturizer and nutrient that works as a thickening agent.
6.	Lemon juice	It helps to lighten the skin and reduce blemish marks, making it effective for treating acne and pimples. Additionally, it acts as a natural way to balance pH levels in beauty products.
7.	Xanthan gum	A gum made by fermenting a carbohydrate, which is also known as Corn Sugar Gum. It serves as a safe thickener and stabilizer.
8.	Orange peel extract	Orange peel extract offers benefits like being an antioxidant, reducing inflammation, and fighting germs. The qualities of orange peel help maintain the natural balance of oils in the skin and can help tighten the skin by absorbing excess oils and removing dead skin cells.
9.	Rose water	It is used as a solvent and has antibacterial and antiseptic qualities that can help heal acne.
10.	Walnut	The scrubbing action of walnut granules works to break down mild oil deposits and remove dead skin cells and dirt.

## Material and method:

### MATERIAL AND INSTRUMENTS:

A concise overview of the glassware, instruments, reagents, and chemicals utilized in the study is provided below.

#### Glassware:

Conical flasks, funnels, glass rods, pipettes, measuring cylinders, reagent bottles, test tubes, beakers, slides, brushes, droppers, crucibles, capillary tubes, and iodine flasks.

#### Instruments:

Water baths, electronic weighing scales, rotary flask shakers, hot air ovens, Soxhlet extraction units, desiccators, test sieves, mixer grinders, spatulas, heating mantles, needles, and mortars and pestles.

#### Reagents:

Fehling's solutions A and B, Dragendorff's reagent, Mayer's reagent, alpha naphthol solution, Wagner's reagent, anthrone's reagent, Folin-Denis reagent, Millon's reagent, Hager's reagent, aqueous basic lead acetate solution, ammonia solution, and phosphoric acid.(6)

#### Methodology ( method ) :

- 1) **Collection:** "We collected neem leaves from the area nearby."The fruits of nutmeg, orange peel, liquorice root, turmeric root, rosewater, honey, Shahi Jeera, and walnut were sourced from the local area.
- 2) **Preparation of Sample Extracts:** To analyze the phytochemicals, a 2g sample of air-dried powder was mixed with 100 ml of alcohol and distilled water in a sealed iodine flask for 24 hours. During the first 6 hours, the mixture was shaken often, and then it was left to sit for the last 18 hours. After that, the solution was filtered through Whatman filter paper. Both the alcoholic and aqueous extracts were utilized for the examination of various bioactive constituents. Preliminary phytochemical screening tests are employed to identify the presence of different organic functional groups, which indicate the types of phytochemicals found in the plant. These tests show the various classes of constituents present in the extract. The following analyses have been conducted for both the alcohol and aqueous extracts. [2]

### Phytochemical Screening:-

#### Tests for alkaloids:

**Dragendorff's test:** A few milligrams of the sample extract dissolved in alcohol were treated with 3 drops of acetic acid and Dragendorff's reagent, then shaken thoroughly. The appearance of an orange-red solid shows that alkaloids are present. Tests for carbohydrates:

**Molisch's test:** To the extract, 2 drops of a-naphthol solution and concentrated sulfuric acid were carefully added along the sides of the test tube. A violet color appearing at the interface of the two liquids indicates the presence of carbohydrates.

**Test for saponins:**

**Foam test:** Mix ten milligrams of the extract with distilled water and shake it well. If you see stable foam, it shows that saponins are present.

**Test for steroids:**

**Liebermann-Burchard test:** The extract was dissolved in chloroform, and then 1 ml of acetic acid and 1 ml of acetic anhydride were added, followed by heating on a water bath and subsequent cooling. When you add 1 or 2 drops of concentrated sulfuric acid to the sides of the test tube, a bluish-green color appears, showing that steroids are present.

**Test for tannins:**

**Ferric chloride test:** Put 2 drops of a diluted ferric chloride solution into the extract. If you see a dark blue color, it means that tannins are present.

**Analysis for flavonoids:**

**Shinoda's test:** To perform the extraction in alcohol, 1 mg of magnesium turnings and 2 drops of concentrated hydrochloric acid were added and heated in a water bath. The presence of a red to pink color shows that flavonoids are present.

**Analysis for phenol:**

Two drops of alcoholic ferric chloride were added in alcoholic extract. If a blue to blue-black color appears, it shows that phenol is present.

**Analysis for coumarins:**

To the alcoholic extract, we added 2-3 drops of a 2 N NaOH solution. If a dark yellow color appears, it indicates that coumarins are present.

**Analysis for triterpenoids:**

The extract was heated with small bits and two drops of thionyl chloride. The appearance of a pink color shows that triterpenoids are present.

**Analysis for carboxylic acid:**

The water-soluble extract was mixed with sodium bicarbonate. The noticeable bubbling shows that a carboxylic acid is present.

**Tests for Resins:**

The extract is analyzed using acetone and distilled water. Turbidity shows that resins are present.

**Tests for amino acids:**

The extract is combined with alcohol and mixed with three drops of ninhydrin solution. A violet color signifies the presence of amino acids.

**Preparation of extract:-** The leaves of neem, rhizomes of turmeric, roots of liquorice, and orange peel were placed in a hot air oven at a temperature of 45°C and ground into small pieces using a grinder. The seeds of nutmeg and Shahi Jeera (cumin) were crushed into a fine powder. Desired quantities of the herbal substances were measured, and each herb was macerated with rose water in a conical flask. The dried herbs were combined with rose water by gently shaking a conical flask for three days. After three days, we filtered the mixture using a simple method and gathered the liquid in separate containers.

**filtration :** The extract was filtered using a regular filter paper and a funnel two times.

**evaporation :** The evaporation was carried out using a water bath. The filtrates were allowed to evaporate in an evaporating pan at a temperature of 60° until the extract reached the desired concentration.

### **Development of formulation ( Facewash ) :**

The required amount of the gelling agent, Xanthum gum, was accurately measured and dispersed in hot rose water (not exceeding 60°C, 50% of the batch weight), while stirring moderately to prevent trapping air and was left to soak overnight.

The needed quantity of lemon juice was mixed with the appropriate amount of honey by gently stirring, and then the specified quantity of concentrated herbal extract was added to the remaining rose water and combined with the honey mixture through gentle stirring, which was ultimately blended with the previously soaked gel formulation. The prepared formulations were transferred into suitable containers and labeled accordingly.(5)

**Table no.1 :- Formulation of herbal Facewash**

<b>Ingredient</b>	<b>Function</b>	<b>%</b>	<b>Quantity (g)</b>
<b>Neem leaf extract</b>	<b>Antibacterial, anti-inflammatory</b>	<b>5%</b>	<b>2.5 g</b>
<b>Turmeric extract</b>	<b>Antiseptic, anti-acne</b>	<b>1%</b>	<b>0.5 g</b>
<b>Nutmeg powder seed</b>	<b>Anti-inflammatory, exfoliant</b>	<b>1%</b>	<b>0.5 g</b>
<b>Liquorice extract root</b>	<b>Soothing, reduces pigmentation</b>	<b>2%</b>	<b>1.0 g</b>
<b>Orange extract peel</b>	<b>Astringent, brightening</b>	<b>2%</b>	<b>1.0 g</b>
<b>Lemon (fresh) juice</b>	<b>Astringent, mild bleaching agent</b>	<b>2%</b>	<b>1.0 g</b>
<b>Honey</b>	<b>Humectant, antibacterial</b>	<b>5%</b>	<b>2.5 g</b>
<b>Walnut powder shell</b>	<b>Gentle exfoliant</b>	<b>2%</b>	<b>1.0 g</b>
<b>Xanthan gum</b>	<b>Thickening agent</b>	<b>1%</b>	<b>0.5 g</b>
<b>Rose water</b>	<b>Base, toner, aromatic</b>	<b>79%</b>	<b>39.5 g</b>

## EVALUATION PARAMETER OF ANTI ACNE FACE WASH

- 1) **Physical Appearance :-** The formulation's visual characteristics were assessed. Color: The formulation's color was evaluated against a white background.  
Odor: The scent of the face washes was examined manually.  
Consistency: The consistency was evaluated by applying it directly onto the skin.
- 2) **pH :-** The pH of a 1% water solution of the formulation was measured with a calibrated digital pH meter, ensuring the temperature remained steady.
- 3) **Greasiness:-** The greasiness was assessed by directly applying the product onto the skin.
- 4) **Spreadability :-** Two glass slides were used in the experiment. A sample of the herbal product was placed on one slide, and then the second slide was put on top of it. To help the sample spread into a thin

layer, a weight of 100 grams was added. This weight was then increased a lot more than before. After that, a weight of 20 grams was added on top of the upper slide. This process was repeated three times to find an average. The spreadability was measured using this formula:

$$S = M \times L / T$$

Where,

S – Spreadability,

M – Weight applied to the upper slide (20 g),

L – Length of the glass (6.4cm). [11]

- 5) **Washability** :- The product was applied to the hands and then observed under running water.
- 6) **Foamability** :-A small quantity of the gel was placed in a beaker filled with water. The initial volume was recorded, the beaker was shaken ten times, and the final volume was noted. The foam ability was also evaluated by applying the product to the skin while it was in contact with water.
- 7) **Stability Studies** :- accelerated stability testing for the formulated product was carried out to evaluate its stability over time. Formulation at room temperature studied for 7 days.
- 8) **Grittiness**:- The product was tested for gritty particles by applying it to the skin [13].

## Result and Discussion:-

- A) Preliminary phytochemical assessment of neem extract which shows the presence of tannins, Alkaloid, Saponins, Glycocides, Terpenoids, Flavonoid, Steroid and Phenol. The results were given in table no. 2.

**Table no. 2:- phytochemical screening of neem**

Components	Present / absence
<b>Tannins</b>	+
<b>Alkaloids</b>	+
<b>Saponin</b>	+
<b>Glycoside</b>	+
<b>Terpenoids</b>	+
<b>Flavonoids</b>	+

- B) Face wash are evaluated based on color, Consistency, pH, spreadability, viscosity, stability, washability, and skin irritancy tests. The results were Given in table no.

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**Table no.3 :- Evaluation Parameters**

Parameters	Results
Colour	Faint Green
Odour	Characteristics
Consistency	Semi-solid
pH	5.4
Greasiness	Non-Greasy
Spreadability	Uniform
Washability	Washable
Foamability	Yes
Grittiness	Non gritty

**Conclusion:-**

This study successfully created and tested a completely herbal anti-acne face wash using natural ingredients like neem, turmeric, nutmeg, liquorice, orange peel, and other plant-based components. These ingredients were selected because of their proven antibacterial, anti-inflammatory, antioxidant, and calming qualities. The face wash not only cleans effectively but also addresses the main causes of acne, such as too much oil production, bacteria growth, and blocked pores, all while being gentle and nourishing for the skin.

Through various tests measuring pH, thickness, how easily it spreads, greasiness, how well it washes off, and foam production, the herbal face wash showed positive qualities that make it a safe and suitable alternative to chemical-filled commercial products. Its lack of harmful chemicals and use of trusted herbal extracts make this formula especially attractive to consumers looking for natural skincare options.

Additionally, analysis revealed that the product contains several helpful bioactive compounds like flavonoids, tannins, alkaloids, saponins, and terpenoids that greatly enhance its healing effects. Stability tests and sensory evaluations confirmed that the product remains effective over time.

In summary, this project highlights the value of combining traditional herbal wisdom with modern formulations. It offers a promising, affordable solution to a common skin issue that is friendly to the skin. The developed face wash has significant potential for future commercialization and could help meet the increasing demand for safe, natural skincare products.

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