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## Formulation and Evaluation of Polyherbal Anti Acne Face Wash and Comparative Study with Marketed Product



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### ABSTRACT

Acne is the most common chronic inflammation disorder that occurs when oil cells are blocked. The hair follicles from ancient we believe that herbal medicine are safer and has low side effects as compared to synthetic medicine herbal therapeutic industry is the oldest cure method of disease and also seen in Vedas. The present work deals with the development and evaluation of the herbal Anti-acne face wash containing aqueous extract of neem leaves (*Azadirachta Indica*), turmeric (*Curcuma Longa*), Liquorice root, shahi jeera, orange peel extract and hydroalcoholic extract of fruit of nutmeg (*Myristica Fragrance*). Although various topical herbal formulations for acne are available in the market, we propose to make pure polyherbal formulation. The plants have been reported in the literature as having good anti-microbial, anti-oxidant, anti-inflammatory activity. Various formulations were evaluated for various parameters like color, appearance, consistency, pH and spreadability. The optimized batch of formulation was compared with the marketed preparation. Amongst all the formulation studies, batch F2 was found optimum for all the parameters. It was a very good attempt to establish the herbal anti-acne face wash containing an aqueous extract of neem leaves, turmeric rhizomes, and fruit of nutmeg.



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## INTRODUCTION

The herbal drug industry in India is probably the oldest medical care system in the world. The history of herbs in ancient India is so old that the ancient form of herbal healing has even been mentioned in the Vedas, an ancient religious work of the Indians. The ancient herbal healing methods of Ayurveda and Unani deal with the use of herbs and natural products to tackle health conditions. Although herbal medicines appear to be new to western healers and medical practitioners, the truth is that most prescribed medicines even today contain plant extracts. At present, countries across the world appreciate this ancient form of medicine and Indian herbal drugs are in good demand, resulting in its rapid growth and witnessing almost a thirty percent growth rate annually (Rashmi,2008). A great increase in the worldwide demand for herbal cures, herbal skin care products and even herbal cosmetics has been observed in recent years.

Skin, being the most exposed part of our body to pathogens, requires protection from skin diseases, especially acne-causing bacteria. Acnes are found to be the most common skin problem that 85% of teenagers face today. They may continue even to adulthood and mostly affect the areas with the largest oil glands like face and neck. Acne is generally characterized by the presence of seborrhea, inflammatory lesions, comedones, excessive sebum production and host to bacteria such as Propionibacterium acnes, Staphylococcus epidermidis, and Malassezia furfur in the follicles. So, these microorganisms can be targeted for potential acne treatment. <sup>[1]</sup>

## ACNE

Acne is a disorder of the hair follicles and oil glands (sebaceous glands). The sebaceous glands secrete oils (sebum) to keep the skin moist. When the glands get clogged, it can lead to pimples and cysts. Acne is very common. People of all races and ages have acne. In fact, most people in the U.S. between 11 and 30 years old will be affected by it. Even people in their 40s and 50s can have acne. However, acne most often begins in puberty. During puberty, the male sex hormones (androgens) increase in both boys and girls. This causes the sebaceous glands to make more oil.

## **Various Types of Acne:**

### **1] Acne Rosacea**

A condition that causes redness and often small, red, pus filled bumps on the face. - Rosacea most commonly affects mid-aged women. Rosacea is inclined to develop in certain stages and causes to create inflammation of the skin of the face especially the foreheads, cheeks, nose as well as chin.

### **2] Acne Vulgaris**

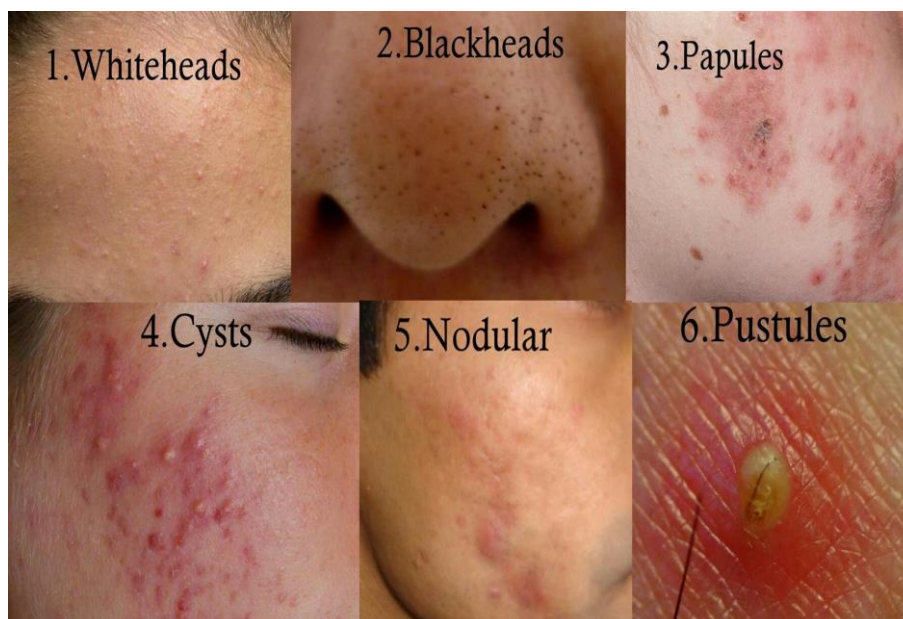
It's is the most common form of acne. Acne vulgaris a general condition that is characterized by the development of seborrhoea, comedones, nodules, pustules, papules and cysts. <sup>[2]</sup>

### **Acne symptoms**

Generally, acne can be categorized into six major types: -

- 1. Whiteheads (non-inflammatory)**
- 2. Blackheads (non-inflammatory)**
- 3. Papules (Inflammatory)**
- 4. Pustules (Inflammatory)**
- 5. Nodules (Inflammatory)**
- 6. Cystic Lesions (Inflammatory)**





### Symptoms of acne

Acne is caused by the following factors

- Excessive oil production.
- Bacterial infection.
- Unhealthy eating habits or a sedentary lifestyle.
- Changes in hormones.
- Stress.<sup>[2]</sup>

### Anti-Acne Facewash

Anti-acne face wash is a formulation of essential ingredients primarily used to treat skin problem such as mild to moderate acne. It also helps in reducing the frequency of breakout and treats other face problems such as pimples, bumps on the face and active acne. Anti acne face wash help in cleansing the skin of the face on deeper level which leads to deep purification. The face wash also works on making the skin soft, gentle, and smooth. It helps by reducing the amount of acne causing bacteria in the skin which leads to bacteria free healthy and glowing skin.

### **Forms of Face Wash**

- Cream based face wash: - A cream cleanser has a thicker, creamy, texture and is formulated with ingredients to help the skin retain moisture, like plant based oils.
- Gel based face wash: - They are a different texture than other cleanser and are provide a small amount of foaming. Gel cleansers clear the skin and pores without stripping them of your normal skin oils.
- Liquid based face wash: - liquid based facewash has been widely used in pharmaceutical due to their high dosing flexibility, ease of swallowing and quick onset of action.

### **Action of Face Wash**

1. Removing the dead cells.
2. Rejuvenating the skin cells elevate stress
3. Removes oil, dirt and impurities.
4. Reduces microbial flora of skin Leave skin fresh and breathing. <sup>[3]</sup>

### **Advantages of Anti Acne face wash**

- They are devoid of or have little side effects, and they also help to totally reduce skin damage and dryness.
- The semi-synthetic face cleanser is quite effective in treating skin irritation.
- They don't include any synthetic or hazardous additives.
- They also provide nutrients to all skin types.

### **Disadvantages of Anti Acne face wash**

- In addition to containing dyes and perfumes that can irritate and exacerbate acne
- Sometimes too harsh can result in excessive drying of the skin, which leads to overcompensation by the oil glands and ultimately to more oil on the surface of the skin. <sup>[4]</sup>

### Benefits of Anti Acne Face Wash

- Keeps face fresh by controlling excess oil secretion
- Prevents blackheads and acne while lightening scars
- Cleanses impurities from deep within the pores
- With regular use expect brighter complexion and radiance
- Hydrates and rejuvenates dull, tired skin
- Toxic chemical free
- No mineral oil
- Suitable for men and women. [5]

### MATERIALS AND METHODS

#### NEEM (*Azadirachta Indica*) [6]

Kingdom **Plantae**

- **Division** Magnoliophyta
- **Class** Magnoliophyta
- **Order** Spindale
- **Family** Meliaceae
- **Genus** *Azadirachta*
- **Species** *A.Indica*
- **Chemical constituents** Nimbinn, Nimbidin, Quercetin.
- **Uses** Skin toner, lightens skin blemishes, remove blackheads



**Fig.no. 1** Neem

## TURMERIC (*Curcuma Longa*)<sup>[7]</sup>

Kingdom Plantae

- **Division** Magnoliophyta
- **Class** Liliopsida
- **Order** Zingiberales
- **Family** Zingiberaceae
- **Genus** Curcuma

- **Species** C. Longa

- **Chemical constituents** Curcumin, Curcuminoids
- **Uses** Reduce acne, Glowing skin, Lightens skin.



Fig.no. 2 Turmeric

## NUTMEG (*Myristica Fragranse*)<sup>[8]</sup>

Kingdom Plantae

- **Division** Magnoliophyta
- **Class** Magnoliopsida
- **Order** Magnoliales

Family Myristicaceae

- **Genus** Myristica Gronov
- **Species** Miristica Fragranse

- **Chemical constituents** Sabinene, 4-terpinol, Myristicin

- **Uses** Treats oily skin, Promotes youthful skin, Acts as a natural toning cleanser.



Fig.no 3 Nutmeg

### LIQUORICE (*Glycyrrhiza Glabra*)<sup>[9]</sup>

- **Kingdom** Plantae
- Division** Magnoliopsida
- **Class** Magnoliopsida
- **Order** Fabales
- **Family** Fabaceae
- **Genus** Glycyrrhiza
- **Species** G. Glabra



Fig.no. 4 Liquorice

- **Uses** Prevents sun damage, Brightens skin, Fades scars, Treats wrinkles.

### CINNAMON (*Cinnamomum zeylanicum*)<sup>[10]</sup>

- Kingdom** Lauraceae
- **Division** Tracheophyte
- **Class** Magnoliopsida
- **Order** Laurales

**Family** Lauraceae

- **Genus** Cinnamomum Schaeff
- **Species** Cinnamomum verum.



Fig.no. 5 Cinnamon

- **Chemical constituents** Cinnamaldehyde, cinnamate, cinnamic acid, and numerous essential oil.
- **Uses** Dealing the breakouts, kills bacteria, reduces size of pimples, unclog pores.



## ORANGE PEEL (*Citrus Sinensis*)<sup>[11]</sup>

- **Kingdom** Plantae
- **Division** Magnoliophyte
- **Class** Magnoliopsida
- **Order** Spindale's
- **Family** Rosacea
- **Genus** Citrus
- **Species** Citrus Sinensis



**Fig.no. 6 Orange peel**

- **Chemical constituents** Pectin, cellulose, and hemicellulose, but poor in protein
- **Uses** Clears the skin, exfoliates dead cells, brightens up, Reverse ageing, Heals acne

## MATERIALS AND INSTRUMENTS

A brief description of the glassware, instruments, reagents and chemicals which were used in the study are given below.

### A. Glass ware

Conical flask, Funnel, Glass rod, Pipettes, Measuring cylinder, Reagent bottle, Test tube, Beaker, Slide, Brush, Dropper, Crucible, Capillary tube, Iodine flask.

### B. Instrument

Water bath, Electronic weighing machine, Rotatory flask shaker, Hot air oven, Soxhlet extraction unit, Desiccator, Test sieves, Mixer Grinder, Spatula, Heating mantle, Needle, Mortal pastel.

### C. Reagents

Fehling's solution A & B, Dragendorff's reagent, Mayer's reagent, Alpha naphthol solution, Wagner's reagent, Anthrone's reagent, Folic Denis reagent, Million's reagent, Hager's reagent, Aqueous basic lead acetate solution, Ammonia solution, Phosphoric acid.

### **Preparation of Sample Extracts**

For analysis of phytochemical, macerated the 2g air dried powder with 100 ml alcohol and distilled water separately in a closed iodine flask for 24 hours, shaking frequently during first 6 hrs and stand for 18 hours. Then the solution was filtered by using Whatman filter paper. Both the extracts alcoholic and aqueous were used for the analysis of different bioactive constituents.

### **Preliminary phytochemical screening**

These tests are used to detect the presence of various organic functional groups, which is indicative of type of phytochemicals present in the plant. These tests indicate the presence different classes of constituents present in the extract. The following tests have been carried out for both alcohol and aqueous extracts.

#### **Tests for alkaloids**

**Dragendorff's test:** To a few mg of sample extract dissolved in alcohol, a 3 drops of acetic acid and Dragendorff's reagent were added and shaken well. An orange-red precipitate formed indicates the presence of alkaloids.

#### **Tests for carbohydrates**

**Molisch's test:** To the extract, 2 drops of  $\alpha$ -naphthol solution and conc. sulphuric acid were added along the sides of test tube. Violet colour formed at the junction of the two liquids indicates the presence of carbohydrates.

#### **Test for saponins**

**Foam test:** To a 10 mg of extract, distilled water was added and shaken. Stable froth formation indicates the presence of saponins.

#### **Test for steroids**

**Libermann-Burchard test:** To the extract was dissolved in chloroform, 1 ml of acetic acid and 1 ml of acetic anhydride were added, then heated on a water bath and cooled. 1 or 2 drops of conc. Sulphuric acid was added along the sides of the test tube. The appearance of bluish green colour indicates the presence of steroids.

### **Test for tannins**

**Ferric chloride test:** To the extract, 2 drops of dilute solution of ferric chloride was added, formation of dark blue colour shows the presence of tannins.

### **Test for flavonoids**

**Shinoda's test:** To extract in alcohol, a 1 mg magnesium turnings and 2 drops of conc. hydrochloric acid was added and heated on a water bath. Formation of red to pink colour indicates the presence of flavonoids.

### **Test for phenol**

To the extract in alcohol, added two drops of alcoholic ferric chloride. Formation of blue to blueblack indicates the presence of phenol.

### **Test for coumarins**

To the extract in alcohol, a 2-3 drops of 2 N sodium hydroxide solution was added. Dark yellow colour formation indicates the presence of coumarins.

### **Test for triterpenoids**

The extract was warmed with tiny bits and 2 drops of thionyl chloride. The formation of pink colour indicates the presence of triterpenoids.

### **Test for carboxylic acid**

Extract dissolved in water is treated with sodium bicarbonate. Brisk effervescence indicates the presence of carboxylic acid.

### **Tests for Resins**

Extract treated with acetone and distilled water. Turbidity indicates the presence of resins.

### **Tests for amino acids**

Extract dissolved in alcohol treated with 3 drops of ninhydrin solution. Violet colour indicates the presence of amino acids.

## COMPOSITION OF DEVELOPED FORMULATION

Sr. no	Ingredient	Quantity taken for 50g gel		
		F1	F2	F3
1	Neem extract	0.5ml	0.8ml	0.3ml
2	Turmeric extract	0.3ml	0.5ml	0.2ml
3	Nutmeg extract	0.3ml	0.4ml	0.5ml
4	Cinnamon extract	0.5ml	0.5ml	0.5ml
5	Liquorice root Extract	0.25ml	0.25ml	0.25ml
6	Orange peel extract	0.25ml	0.25ml	0.25ml
7	Lemon juice	0.15ml	0.15ml	0.15ml
8	Shahi jeera extract	0.1ml	0.1ml	0.1ml
9	Honey	0.5ml	0.5ml	0.5ml
10	Xanthum gum	0.15g	0.5g	0.01g
11	Rose water	q.s to 50g	q.s to 50g	q.s to 50g

## PREPARATION METHOD

### 1. Collection

Leaves of neem were collected from the local area. Fruit of nutmeg, orange peel, liquorice root, turmeric root, rosewater, honey, Shahi Jeera, walnut were collected from the local area.

### 2. Preparation of Extract

- Leaves of neem, rhizomes of turmeric roots of liquorice, orange peel were kept in hot air oven for the purpose at 45°C temperature and grinded into small pieces with the help of grinder. Seeds of nutmeg and Shahi Jeera (cumin) and bark of cinnamon were crushed to

make powder.

- Desired quantities of herbal drugs were weighed and each herb macerated with rose water in conical flask.
- Dried herbs were mix with rose water by moderate shaking of conical flask for 3 days separately.
- After 3 days, contents were filtered out by using a simple filtration method and filtrates were collected in vessels separately.

### **3. Filtration**

Filtration of extract was done by using simple filter paper and funnel 2 times.

### **4. Evaporation**

Evaporation process was done with the help of water bath. Filtrates were allowed to evaporate in evaporating pan at 60° temperatures until the desired concentration of the extract was obtained.

### **5. Development of Formulation**

- The desired concentration of gelling agent i.e. Xanthum gum as weighed accurately and dispersed in hot rose water (not more than 60°C, 50% weight of the batch size) with moderate stirring.
- Desired quantity of lemon juice was dissolved in desired amount of honey by gentle stirring.
- Desired quantity of concentrated herbal extract were added to the remaining amount of rose water and mixed with above honey by gentle stirring, this was finally mixed with previous soaked gel formulation.
- Prepared formulations filled in a suitable container and labelled accordingly. <sup>[12]</sup>

### **Marketed formulation**

Patanjali saundarya neem and tulsi face wash was purchased from the local market. <sup>[12]</sup>

## EVALUATION PARAMETER OF ANTI ACNE FACE WASH

Prepared formulation evaluated for following tests and compared with marketed Himalaya neem face wash.

### 1) Physical Appearance

**Visually** checked the physical appearance of the formulation.

**Colour:** The colour of the formulation was checked out against a white background.

**Odour:** The odour of the face washes was checked manually.

### 2) Consistency

The consistency was evaluated by applied on the skin.

### 3) Ph

PH of 1% aqueous solution of the formulation was measured by using a calibrated digital PH meter at constant temperature.

### 4) Greasiness

The greasiness was assessed by directly applying on to the skin.<sup>[2]</sup>

### 5) Spreadability

Two slides are taken and herbal sample was placed on one slide. Other slide was placed on the first slide. 100 g of weight was kept on the slides so that it spreads as a thin layer.

Weight was being eliminated much high than the prisons. Next weight of 20 g was kept on the upper slide. It was performed for 3 times and average was calculated.

Spreadability was calculated by using the following formula,  $S=M \times L/T$

Where,

S- Spreadability, M- Weight tied to the upper slide (20 g) Length of the glass (6.5 cm), T – Time.<sup>[11]</sup>

### 6) Washability

The product was applied on hand and was observed under running water.

### 7) Foamability

Small amount of gel was taken in a beaker containing water. The initial volume was noted, beaker was shaken for 10 times and the final volume was noted. Foamability was also analysed by applying onto skin with contact with water.

### 8) Accelerated Stability Studies

Accelerated stability testing of prepared formulation was conducted for most stable formulation at room temperature studied for 7 days.

### 9) Grittiness

The product was checked for the presence of any gritty particles by applying it to the skin. <sup>[13]</sup>

## RESULTS AND DISCUSSION

### Preliminary phytochemical screening of extracts

Sr.No	Name of experiments	Observation				
		Neem	Nutmeg	Turmeric	Liquorice root	Cinnamon extract
1	<b>Alkaloids</b> • Mayer's test	Positive	Positive	Positive	Positive	Negative
2	<b>Carbohydrate</b> • Anthrone's test	Positive	Negative	Negative	Negative	Negative
3	<b>Proteins</b> • Millon's test	Positive	Positive	Negative	Negative	Negative
4	<b>Saponin test</b> • Foam test	Positive	Positive	Negative	Positive	Positive
5	<b>Tannin test</b> • Ferric chloride test	Negative	Positive	Negative	Positive	Negative
6	<b>Phenolic compounds</b>	Positive	Positive	Positive	Negative	Positive
7	<b>Flavonoids test</b> • Shinoda's test	Positive	Negative	Positive	Positive	Negative
8	<b>Steroid test</b> • Salkowski's test	Positive	Negative	Negative	Positive	Negative
9	<b>Glycoside test</b> • Borntrager's Test	Negative	Positive	Positive	Positive	Positive

**RESULT OF EVALUATION PARAMETER**

Sr.No.	Parameters	Observation		
		F1	F2	F3
1	Color	Lemon Yellow	Lemon Yellow	Lemon Yellow
2	Odour	Characteristic	Characteristic	Characteristic
3	Nature	Semisolid	Semisolid	Semisolid
4	Consistency	Smooth	Smooth	Smooth
5	Homogeneity	No Aggregation	No Aggregation	No Aggregation
6	Washability	Washable	Easily Washable	Washable
7	pH	6.67	6.82	6.78
9	Extrudability	Extruded	Easily Extruded	Easily Extruded
10	Spreadability	5.876	5.416	5.786
11	Skin Irritation	No Irritant Action	No Irritant Action	No Irritant Action

- This study revealed that the developed herbal formulation of batch F2 was comparatively better than F1 and F3 formulations. Amongst all the formulation studies, batch F2 was found optimum for all the parameters. So we take batch F2 and compare it with a marketed product.

**Comparative study with marketed product:**

**Physical appearance:**

Formulation / batch code	Color	Odour
Marketed	Green	Pleasant
F2	Lemon yellow	Pleasant

**pH:**

Formulation code	pH
Marketed	6.45
F2	6.82



**Greasiness:**

<b>Formulation code</b>	<b>Greasiness</b>
Marketed	No
F2	No

**Washability:**

<b>Formulation code</b>	<b>Washability</b>
Marketed	Good
F2	Good

**Homogeneity:**

<b>Formulation code</b>	<b>Homogeneity</b>
Marketed	Homogeneous
F2	Homogeneous

**Spreadability:**

<b>Formulation code</b>	<b>Spreadability</b>
Marketed	5.909
F2	5.416

**Viscosity:**

<b>Formulation code</b>	<b>CP</b>
Marketed	4.702
F2	5.982

## CONCLUSION

This present article comes to conclusion that the people need perfect skin care treatment or remedy but without causing any kind of toxic effect on their beautiful faces. Natural remedies are more suitable in the assurance that they are safer with fewer side effects than synthetic ones. Nowadays, herbal formulations are trendy and demanded, so our purpose is to develop multi-herbal face wash formulations for acne. The formulation includes the antibacterial, anti-acne, anti-aging, antioxidant, and anti-inflammatory properties that are used to glow of the skin and promote beauty except for the disorders. This study concludes that our face wash gives beneficial effects on the skin. A prepared multi-herbal formulation is more efficacious, stable and patented as compared to synthetic formulations in the treatment of skin ailments.

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