



## RESEARCH ARTICLE

### FORMULATION AND EVALUATION OF HERBAL CREAM FOR ACNE

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#### ABSTRACT

Acne vulgaris is an extremely common skin disorder that affects virtually all individuals at least once during life. The incidence of acne peaks at teenage, but substantial numbers of men and women between 20-40 years of age were also affected by disorder. Acne is a disorder of the sebaceous follicles, which are specialised pilosebaceous units located on the face, chest and back. They consist of sebaceous glands associated with small hair follicles. Several factors contribute to the pathogenesis of acne, such as sebum, abnormal follicular differentiation, propionibacterium acnes etc. Herbal cosmetics are now getting more important as its side effects are comparatively less than that of synthetic one. Different plant parts such as leaves, stem, bark, wood, rhizomes are used in cosmetics. Neem containing creams possess a wide range of pharmacological properties especially as Antibacterial, Anti inflammatory.

**Key words:** Herbal cream, Acne vulgaris, Neem, Antibacterial property.

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#### INTRODUCTION

Cream is a topical preparation usually for application to skin. They are also applied to the mucous membranes such as those of the rectum, vagina. Cream may be considered pharmaceutical products as even cosmetic creams are based on techniques developed by pharmacy. There are two types of cream, Oil in water (o/w) type creams which are composed of small droplets of oil dispersed in a continuous watery phase. And Water in oil (w/o) type creams which are composed of small droplets of water dispersed in a continuous oily phase. The main uses includes provision of a barrier to protect the skin, Cleansing, Emollient effect, and as a vehicle for drug substance such as local anesthetics, anti inflammatory, hormones, antibiotics, antifungals or counter-irritants. Acne, also known as acne vulgaris, is a longterm skin disease that occur when hair follicles are clogged with dead skin cells and oil from the skin. It is characterized by blackheads or whiteheads, pimples, oily skin, and possible scarring. Here our aim is to formulate herbal cream for acne with the ingredients obtained from our locality.

#### MATERIAL AND METHODS

##### Isolation technique used in formulation of cream

**Preparation of turmeric powder:** Rhizomes of turmeric was taken and washed thoroughly with water to remove impurities and is properly dried under shade. The dried turmeric were cut in to small pieces and grind properly. The powder was passed through sieve no:150 and properly stored ([www.freepatentsonline.com/7763289.html](http://www.freepatentsonline.com/7763289.html)).

**Extraction of amla:** Amla extract was obtained from amla fruits. Amla fruits are first washed thoroughly to remove any impurities. After washing, the amla fruits are grinded with required amount of water and made in to pulp form, it is then passed through muslin cloth for obtaining fine particles. The cloudy solution was kept for long time and decanted. Then the sedimented portion was dried in to powder form by using hot air oven ([www.ayurvedic-medicines.com/herbs/amlam.html](http://www.ayurvedic-medicines.com/herbs/amlam.html)).

**Extraction of aloe vera:** Aloe vera juice was obtained from leaves of Aloe vera. The leaves were collected from matured plant with a sharp knives slice the spiny sides of each leaves. So the juice was collected in to a container quickly ([www.btccgroup.com/aloe\\_vera.html](http://www.btccgroup.com/aloe_vera.html)).

**Preparation of red sandal wood powder:** The heart wood of red sandal wood was taken and sliced in to small pieces and

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grinded well in to powder form. The powder was then passed through sieve no: 150 and stored properly ([www.buzzle.com/articles/redsandalwood-powder-for-face.html](http://www.buzzle.com/articles/redsandalwood-powder-for-face.html)).

**Extraction of volatile oil from guava leaves:** The extraction of volatile oil was done by using Clevenger apparatus. The matured guava leaves are collected and washed properly. And the leaves were cut in to small pieces and taken in the round bottom flask and set up the apparatus and add sufficient amount of water. Then maintain the temperature firstly at 30 degree Celsius and gradually increased up to 80 degree Celsius. After 3-4 hours volatile oil are start to extract from leaves and are collected to a suitable container.

**Extraction of volatile oil from lemon peel:** The extraction of volatile oil is done by using Clevenger apparatus. The fresh lemon fruit are collected and washed thoroughly. Then the peels are separated by using sharp knives. And peels were kept in round bottom flask and set up the apparatus and add required amount of water, maintain the temperature firstly at 30 degree Celsius and gradually increased up to 80 degree Celsius. After 3-4 hours volatile oil are start to extract from peels and are collected in to suitable container.

**Preparation of neem powder:** The fresh matured leaves of neem were collected and washed with water to remove impurities. Then it dried under the shade, after drying it is grinded well and passed through the sieve no: 150 and properly stored ([www.ayurvedic-medicines.com/herbs/neem.html](http://www.ayurvedic-medicines.com/herbs/neem.html)).

**Extraction of tulsi:** The fresh leaves of tulsi was collected and washed. And taken in a mortar and pestle and are grinded well with required amount of water in order to get juice. Then the juice are filtered to remove any particles present.

**Formulation of herbal cream:** The herbal cream comes under the category of o/w type cream. In which water is used as an continuous phase so this type cream can be easily washable from the skin. And also it is less greasy and easier to apply. Due to the presence of herbal ingredient it has less side effects.

**Basic components of cream:** A cream consist of two basic components being an oil and aqueous phase. The oil soluble and water soluble ingredients are added in to either of these two phases respectively according to their nature ([www.pindariherb.farm.com-MakingCreams](http://www.pindariherb.farm.com-MakingCreams)).

#### Aqueous phase components

In o/w type cream aqueous phase is continuous phase and consist of 50% to 80% w/w of a cream.

**The water soluble ingredients are also considered in aqueous phase. It include**

- Herbal extracts such as Neem, Aloe, Turmeric, Sandalwood powder and Amla extracts
- Preservatives such as methyl paraben and propyl paraben are added to prevent the growth of bacteria due to the presence of water content.
- Glycerin it added with water in order to improve cream texture and also act as Humectant.

**Oil phase component:** This phase consist of between 15% to 30% of a cream. The oil soluble ingredients and cream bases are added to this phase. It include

- Cream base such as stearic acid
- Essential oil such as citrus oil and guava oil

A cream is formed when the oil phases is successfully emulsified in to aqueous phase to form a stable o/w emulsion of semi solid consistency. During making cream following things should be considered.

#### Ingredients of herbal cream

**Active constituents:** Active constituent involved in the herbal cream are following

Sl: no	Active ingredients
1	Extract of <i>Embolica officinalis</i>
2	Extract of <i>Citrus aurantium</i>
3	Extract of <i>Psidium guajava</i>
4	Extract of <i>Aloe vera</i>
5	Powder of <i>curcuma longa</i>
6	Powder of <i>Azadirachta indica</i>
7	Powder of <i>Pterocarpus santalinus</i>
8	Extract of <i>Ocimum sanctum</i>

**Excipients:** Excipients are an inactive substance used as a carrier for the ingredient of medication. In general the active ingredients may not be easily administered and absorbed by the body they need to be put in some appropriate form. The following excipients are used in this cream (Janice Cacace). In our cream stearic acid is used as cream forming base. It is an 18 carbon fatty acid and are white waxy solid crystalline and are widely used because stearic acid helps water and oil mix, stearic acid helps in preventing the formulas from separating into liquid and oily layers. As a result, products that contain stearic acid require less shaking prior to use and remain more potent when stored for extended periods of time (Mehta; [www.Wikipedia.com](http://www.Wikipedia.com))

**Preservatives:** Paraben are the main class of chemical used as preservative in the cosmetics because of their bactericidal and fungicidal properties. In our cream about 0.1 – 0.2% paraben is used as preservative ([www.Wikipedia.com](http://www.Wikipedia.com)).

**Emulsifying agent:** Emulsifying agent reduce the interfacial tension between the two phases. It is used in cream to maintain the stability. It also known as emulsifier or emulgent. In our cream potassium stearate is the emulsifying agent, which is formed by the reaction between potassium hydroxide and stearic acid. It is a white fine powder with fatty odour (Mehta).

**Humectant:** Humectant is a substance used in cosmetic preparations which helps in retaining moisture. Glycerin is frequently added in moisturizing lotion and creams for the purpose moisturizing and smoothing skin. To make Aloe vera gel, make a glycerol extract of the aloe gel by scraping the gel from the fresh leaf and blending to liquefy the mucilage. Add equal amount of glycerin and blend this mix well. It allow the gel to be successfully added (Mehta).

#### Procedure

- Weigh the Stearic acid and kept on the water bath at 80° C.
- Extract of Amla, Turmeric, Sandalwood, Neem and extract of Tulsi were dissolved in required amount of water.
- Potassium hydroxide and preservatives such as methyl Paraben and propyl paraben were added and dissolved properly.
- The above solution kept on the water bath at 80° C

- Weigh required amount of volatile oil such as lemon and guava leaf were added to the melted stearic acid.
- The Aloe vera juice mixed with the same quantity of glycerin and added to aqueous phase.
- Finally aqueous phase was added to the oily phase by constant stirring till a homogenous mixing was obtained.
- Allow to cool in room temperature.
- Add rose oil for fragrance

### Evaluation test

**Physical parameters:** Various physical parameters such as colour, appearance, nature were evaluated.

**Extrude ability test:** The method adopted for evaluating cream formulation for extrude ability was based up on the quantity in percentage of cream extrude from tube on application of finger pressure.

**Method:** Empty collapsible tube was weighed. Then the tube was filled with cream. Cream was extruded by applying finger pressure on the tube. Measure the amount of cream extruded through the tip when a pressure was applied on the tube (Purushothaman Rao, *et al.*, 2010).

**Spreadability:** For the determination of spread ability, excess of sample was applied in between two glass slides and was compressed to uniform thickness by placing 100 g weight for 5 minutes. The time required to separate two slides was taken as measure of spreadability (Akash *et al.*, 2015)

$$S = m \times l / t$$

l = Length moved on glass slide

t = Time taken

m = Weight tied to upper slide

### Antibacterial activity

#### Medium

**Nutrient agar medium are used:** The growth medium is a solid which contain 25% agar as solidifying agent. It is designed to support the growth of micro organism or cells. The most common growth media for microorganisms are nutrient broths (liquid nutrient medium). Liquid media are often mixed with agar and poured via a sterile media into petridish to solidify. These agarplates provide a solid medium on which microbes may be cultured.

#### Ingredients

- A carbon source such as glucose
- Water
- Various salts
- Source of amino acids and nitrogen (e.g., beef, yeast extract)

### Sensitivity studies

**Preparation of inoculums:** The inoculums for the experiment were prepared in fresh nutrient broth from preserved slant culture. The turbidity of the culture may be adjusted by the addition of sterile saline or broth.

**Drug used:** Anti acne cream

**Standard used:** Ampicillin

**Vehicle used:** Dimethyl sulphoxide (DMSO)

**Preparation of sterile swabs:** Cotton wool swab on wooden applicator or plastics were prepared and sterilized by autoclaving or dry heat (only for wooden swabs) by packing the swabs in culture tubes, papers or tins etc.

**Sterilization of forceps:** Sterilize forceps by dipping in alcohol and burning off the alcohol.

**Experiment:** The standardized inoculums is inoculated in the plates prepared earlier (aseptically) by dipping a sterile in the inoculums removing the excess of inoculums by passing by pressing and rotating the swab firmly against the side of the culture tube above the level of the liquid and finally streaking the swab all over the surface of the medium 3 times rotating the plate through an angle of 60° C after each application. Finally pass the swab round the edge of the agar surface. Leave the inoculums to dry at room temperature with the lid closed. Each Petri dish is divided into 3 parts, in each part sample discs such as CC(100µg) disc (discs are soaked overnight in SAMPLE solution) and Standard Ampicillin 10µg, are placed in the plate with the help of sterile forceps. Then Petri dishes are placed in the refrigerator at 4° C or at room temperature for 1 hour for diffusion. Incubate at 37 ° C for 24 hours. Observe the zone of inhibition produced by different samples. Measure it using a scale and record the average of two diameters of each zone of inhibition (Nostro *et al.*, 2000).

Sl.no.	Organisms	Zone of inhibition (mm)	
		Standard ampicillin (10µg/disc)	Samples (100µg/disc) CC
1.	Escherichia coli	42	11
2.	Staphylococcus aureus	26	10

## RESULT AND DISCUSSION

### Physical parameter

**Data showing different physical parameters:** As the PH of the formulation is neutral, it will not cause any skin irritation. Formulation was smooth and slippery on application to skin.

Colour	Brownish white
Appearance	Opaque
Feel on application	Smooth

**Extrude ability test:** The cream showed a good Extrude ability of 82.656% ±0.02. Extrude ability as an important parameter for extrude ability cream formulation. A good extrude ability, reduces the force required to remove the formulation from the tube. The cream showed a good of 82.56% ± 0.02. calculation as shown in table. Extrude ability is an important parameter for cream formulation. A good extrude ability reduces the force required to remove the formulation from the tube.

Weight of cream(g)	Weight of extruded cream(g)	Extrude ability %± Sd
10g	8.256g	82.56%

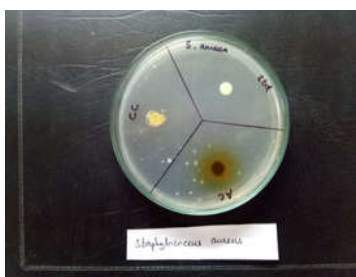
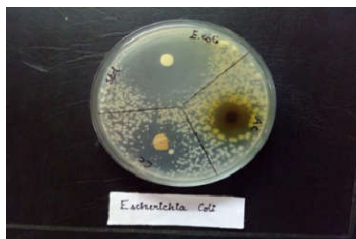
**Spreadability:** The spreadability was found to be 46.876 gcm<sup>2</sup>/sec. as there are no grade for spread ability, in comparison with the other publication the cream shows a good spreadability, i.e, expansion of a semisolid formulation on a

surface, after a certain time. Anti bacterial activity of formulated cream by using selected standard culture of Staphylococcus aureus and Escherichia coli were done by cylindrical plate method.

Sample	Length (cm)	Time taken (sec)	Spreadability (gcm <sup>2</sup> /sec)
Cream	7.5cm	16sec	46.876gcm <sup>2</sup> /sec



Sl.No.	Zone of Inhibition(mm)	
	Standard Ampicillin IN (10µg/disc)	Samples (100µg/disc)
	Organisms	
1.	Staphylococcus aureus	26
2.	Escherichia coli	42



**Conclusion**

Herbal formulation of an anti acne preparation contains various active constituent. The combination of various herbal medicine was found to be active against acne causing organism. This formulation contain different active constituent have various properties such as

- Anti bacterial ( Neem, Tulsi, Guava leaf)
- Anti inflammatory (Aloe vera, Turmeric)
- Anti oxidant ( Amla, Citrus oil)
- Cooling effect (Red sandal wood)

The active principles in the herbal formulation can reduce the itching, redness, swelling due to the presence of anti bacterial and anti inflammatory action of constituent, volatile oil exerts anti oxidant activity so can prevent the aging of skin. Also can reduce dryness, burning and itch. In present study aim at herbal formulation was prepared and various parameters are evaluated. The herbal cream shows pH (5.6), good extrudability (82.56%) and spreadability (46.875g cm/sec). The anti microbial study shows that better zone of inhibition. So the all studies assure that the prepared formulation was good for treating acne vulgaris.

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