

**FORMULATION AND EVALUATION OF HERBAL ANTI ACNE CREAM**

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**ABSTRACT:**

Now a days there is huge demand of the herbal products mostly herbal cosmetics which were used by the most of people now a days so there is increasing demand of the herbal products. Acne is the most observed skin problem which can be treated with the herbs the plant of azadirachta Indica leaves can be used in treatment of acne this plant cannot be used directly that can harm to the human skin for that the Herbal formulation of the cream is designed and evaluated. The cream is further evaluated for the safety and stability studying for the effective use in humans. For Indian people neem is very religious plant that having the multipurpose activities like antibacterial, anti-fungal, etc.

**Key words:** Azadirachta Indica, cosmetic, stability, Spread ability, Acne, acne vulgaris.

**INTRODUCTION:**

According to market research herbal cosmetics industry is most growing sector in India. As there is large no of the medicinal plants showing the medicinal activity, most of the plant were used by the Indian people as row as cosmetic medicine but for good effectiveness it should be prepared in dosage form for better effect. Herbal cosmetics, also referred to as products, are made by mixing one or more herbal ingredients with a range of approved cosmetic chemicals. The term "herbal cosmetics" describes goods that are only used to provide certain cosmetic benefits. The demand for herbal medicines is growing significantly because they have no negative side effects. Rather than harming the body in any way, herbal components naturally replenish it with vitamins and other essential nutrients. Plants include a wide range of complex active molecules called phytochemicals that, in addition to relaxing and smoothing skin, may also actively repair, treat, and protect it, according to scientific literature.<sup>1</sup>

There are several medicinal herbs that are frequently used to treat skin conditions and also have antibacterial properties. Plants, nevertheless, are their primary active chemical ingredients determine their therapeutic action and are quite complicated in their makeup. Standardization of herbal drugs is now of utmost relevance due to incorrect plant authentication, microbial alterations, and pesticide residue. Therefore, it is vital to authenticate these therapeutic herbs before employing them in any preparation.

Acne is one of the major skin problems which interfere with the beauty of the skin as well. For overcome it the many formulations can be used with the API but mostly everyone prefers to the herbal cosmetics for their treatment. Antimicrobial action of the *azadirachta indica* leaves where observed for the treatment of the acne.

Cream was formulated for the treatment of acne and the evaluation tests are performed for the physicochemical stability and the assignment of organoleptic characteristics over the time thereby to verify its efficiency. This herbal skin care product (semisolid cosmetic cream) leaves no poisonous residue or other irritants behind and may successfully preserve skin when used regularly. It is also free of alcohol and parabens. It must also meet the requirements concerning appearance.

**Cream:** The semisolid dosage form that may be applied to the skin and other external body parts are called creams. The consistency of creams varies based on the quantity of water and oil present; they are defined as "viscous liquid or semi-solid emulsions of either the water-in-oil type or the oil-in-water type" dosage forms. Cream are used for therapeutic or cosmetic functions such as washing, beautifying, enhancing looks, protecting, etc. [ 1, 3] These topical preparations are used to deliver the drug specifically to the mucous membrane or the layer within the skin. These products are designed for topical application to the skin for more efficient site-specific drug delivery into the skin to treat disorders.<sup>2</sup>

Creams are thought of as pharmaceutical items since they are produced utilizing techniques used in the pharmaceutical business. Creams, both medicated and unmedicated, are frequently used to treat a range of dermatoses or skin conditions.[2] Ayurvedic, herbal, or allopathic creams can be utilized by individuals depending on their needs for their skin issues.[3]A suitable base has been used to dissolve or distribute one or more drug molecules. Creams can be categorized as o/w or w/o forms of emulsions based on their phase composition

#### **ACNE VULGARIS:**

The kind of acne vulgaris Skin conditions are brought on by irregular sebaceous gland production, which starts at the base of the skin and at the hair follicles. Acne damages the skin's pilosebaceous units, leading to a range of lesions with different degrees of inflammation, such as acne scars and hyperpigmentation. According to Olutunmbi et al., acne lesions are more commonly found on the face, chest, upper back, and upper arms—areas with a high density of sebaceous glands.<sup>3</sup>

The four main pathogenic factors that lead to the start of acne are increased sebum production, aberrant follicular desquamation, proliferation of *Propionibacterium acnes*, and localized inflammation. These four components are given examples. [19,20]

## 1. Additional Sebum Production

According to Gollnick, androgen hormones, particularly testosterone, cause an increase in sebum synthesis and release. Given the substantial correlation between sebum production and the prevalence and severity of acne lesions, it is imperative to consider this factor while working with individuals suffering from acne vulgaris.

**2.Comedone formation:-Keratinocytes that are lost as single cells to the lumen are usually discharged from healthy follicles. The abnormal desquamated corneocytes, along with various lipids and monofilaments, build up in the sebaceous follicle of acne sufferers due to the overproliferation and improper shedding of keratinocytes. The result of this is comedogenics.<sup>4</sup>**

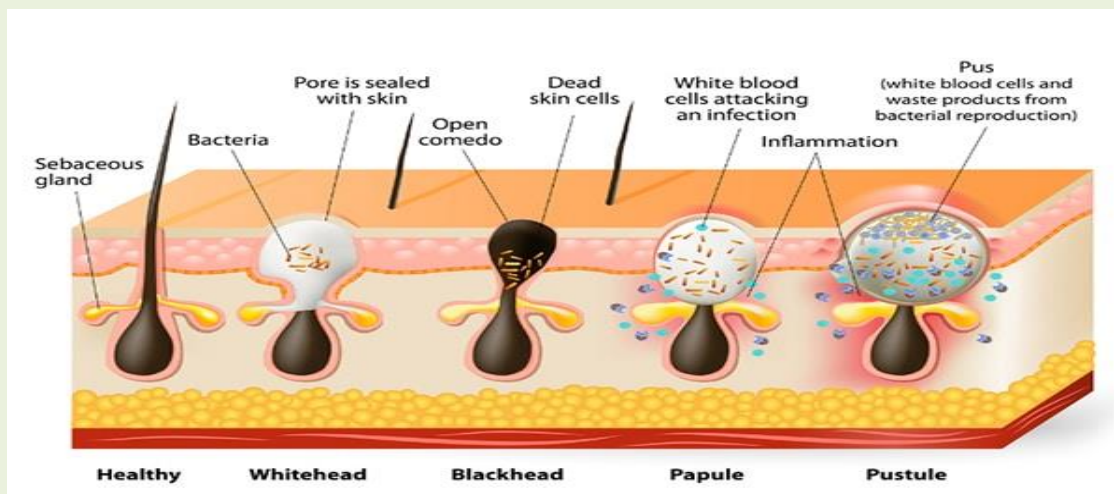


Fig no 1. Comedone formation

## Review of literature

The information of the plant was referred from the national pharmacopeia in which the monographs for all the plants were given. Other articles and the papers of the Asian journal of pharmaceutical and clinical research were studied for the evaluation of the parameters of the cream against the safety and the quality purpose. To initialize this research work various literatures like the books, articles, and formulators were followed and all these articles and the books are previously published. These sources are used only for the supportive measures of the research for the information purpose.

In science Direct by Prof. Hywel C. Williams and Robert P Dellavalle MD has given the "information about the acne vulgaris" they said The skin's pilosebaceous unit, which has oil glands and hair follicles linked is affected by acne. Papules and pustules are examples of

inflammatory lesions; seborrhea (excess oil), open and closed comedones, and varying degrees of scarring are some of the clinical aspects of acne. In addition to having the highest density of pilosebaceous units, the face, neck, upper chest, shoulders, and back are the body parts where acne is most common. Indicators of severe nodulocystic acne include nodules and cysts. A synopsis of acne vulgaris, or common acne, is given in this webinar. Acne associated with polycystic ovarian syndrome, acne rosacea, acne inverse, drug-induced acne, infantile acne, and acne categorization have all been studied. In December 2002, Loren Cordain, PhD; Staffan Lindeberg, MD, PhD; and Magdalena Hurtado published "Acne Vulgaris - A Disease of Western Civilization," which draws conclusions on the severity of acne in Western culture. It is unlikely that genetic variances among people account for the remarkable difference in acne incidence rates between non-Westernized and fully industrialized countries; instead, a number of environmental factors are probably responsible. Finding these variables may help with acne therapy in Western populations. This article describes acne as an extremely serious skin condition. Four well-known pathogenic variables that contribute to acne are the focus of acne treatment. "Treatment Modalities for Acne" is the title of the article. Different forms of therapy are included in this study, including topical (retinoids and antibiotics) and systemic (retinoids, antibiotics, and hormonal) therapies.

Tejswini Devidas Navgire, Madhuri Baburao Pawar, They were mentions all the formulation process and the evaluation that is required for the cream in the article with the name of "Formulation And Evaluation Of Cold Cream"

In the article of "Chemical and biological investigations on Azadirachta indica (the neem tree)" by the T. R. Govindachari on 10th August 1992, it gives the all information of the plant of azadirachta Indica and its overall information of chemical constituents, synonyms, geographical sources and other information.

"Development and evaluation of antimicrobial herbal cosmetic preparation" By Sonika Pandey\*, Akanksha Seth, Rajesh Tiwari, Sunita Singh, H. M. Behl and Suman Singh Biotech Park, Lucknow, India. Received 3 December, 2013; Accepted 29 April, 2014. The author stated according to pharmacopeia actual how to perform the evaluation tests on the cream is stated all the detailed process of stability test, spread ability test, viscosity test, pH test, irritation test etc. are followed as given in their article.

In European PMC the research on the activities of the azadirachta Indica is performed by Badam L., Joshi SP., Bedekar SS. Researchers examined the antibacterial properties of azadirachta indica on the Coxsackie B group of viruses, and they discovered that azadirachta indica was particularly efficient against the Coxsackie virus B-4. All information is provided in an article titled "In vitro" antiviral activity of neem (Azadirachta indica. A. Juss) leaf extract against

group B coxsackie viruses, which was published in the department of pharmacology on June 1, 1998.<sup>4</sup>

### **Azadirachta indica:**



**Fig no. 2. Azadirachta indica:**

### **PLANT INFORMATION**

**Synonyms:** Neem, nimtree, Indian lilac, nimba.

**Biological Sources:** Most of areas of Maharashtra, Karnataka and nearby States of India. [9,10]

There is inadequate scientific evidence to support the use of neem as a medicine, despite the fact that products made from neem trees have been used in Indian traditional medicine for generations to cure rheumatism and skin problems. While no particular doses have been determined for humans, short-term neem usage seems to be safe, long-term neem use may affect the kidneys or liver, and neem oil is poisonous to young children and can be fatal. Miscarriages, infertility, and low blood sugar are further side effects of neem. [10,11,13]

### **Benefits of Azadirachta indica for face:**

It may be applied to the face and hair and serves as a barrier against dandruff.

- Take care of a dry scalp to make it glossy and smooth.
- Make skin more radiant and have an aging impact.
- Promote better blood flow.
- Assist in ulcer treatment.
- Maintain a healthy shine on the skin.
- The anti-bacterial qualities of neem help to clear up acne.

- Neem reduces the visibility of and fades acne scars.

Neem contains fatty acids and glycosides, which have anti-inflammatory properties.

- Vitamin E and antioxidants found in neem help to prevent wrinkles.
- Neem's fatty acids and vitamin E nourish skin.
- Provide eczema relief.
- Manage acne.

Avoid skin infections.

- Produces an even skin tone.
- Has anti-aging advantages.

#### **MATERIAL AND METHODS:**

##### **Chemicals & Glasswares:**

All the chemical and the reagents were used from fabtech institution. Materials and equipment were used from the fabtech education society.

**Borax:** -Numerous cosmetic items, such as lotions, gels, and creams, include both borax and wax. It is commonly known that this ingredient is used in hand soaps to aid in removing oil or grease from hands. The ideal component for cleansers and toners is borax due to its alkaline properties [12]. As an emulsifier, buffering agent, or preservative, borax can be found in cosmetic goods such scrubs, creams, shampoos, gels, lotions, bath salts, and bath bombs. Borax is a part of "slime," a sticky substance that plays well with children and is formed of glue, water, and other ingredients. Creams, body lotions, shampoos, bath gels, and even the well-known bath bombs are frequently made with borax as an ingredient.<sup>12,13</sup>



**Fig no 3. Borax Powder**

**Beeswax:** Beeswax has the ability to act as a barrier against irritants when it is applied topically. Skin can be protected from inclement weather and environmental contaminants by it. Not only can beeswax soothe and moisturize hair, it can also stop moisture from escaping. Beeswax can act as a barrier of defense on the skin. [15,16] Since it is a humectant, it also attracts water. These two qualities might help keep the skin moisturized. A natural exfoliant that is great for removing dead skin cells is beeswax. Beeswax is an antimicrobial substance that also softens and cures skin. You may use it to combat skin issues including stretch marks, eczema, dry skin, and acne.<sup>16,17</sup>



**Fig no 4. Beeswax**

**Collection of plants:**

*Azadirachta indica* leaves were collected from the geographical location of Sangola, Solapur, Maharashtra, India.



**Fig no5. Preparation of extract:**



After being gathered, leaves of *Azadirachta indica* were dried for two days at 40°C (+/-) 1°C. Next, until the extraction, leaves are ground into a powder and kept in packets of airtight bags. Using pure ethanol as a solvent, the dry powder is then taken further. This involves adding 25 g of powdered medication to 150 ml of 100% ethanol solution and letting it sit overnight. After carrying out the extraction procedure three times the following day, the filtered solvent was removed, and the resulting extract was kept in storage at 5–6°C until it was further processed.<sup>18</sup>

#### **Perfume (Rose water):**

in the cream formulation the rose water is used as the perfume agent as it smells like the Rose It should not be surprising that rose water may lighten skin tone and lessen redness given that it has been utilized for aesthetic reasons for hundreds of years [22,23]. The antibacterial properties could make acne less severe. Skin redness and puffiness may be lessened by the anti-inflammatory characteristics. Skin's natural pH balance is preserved by rose water. Because chemically manufactured soaps and cleansers upset our skin's pH balance, bacteria that can cause rashes and acne can thrive on it<sup>24,25,26</sup>

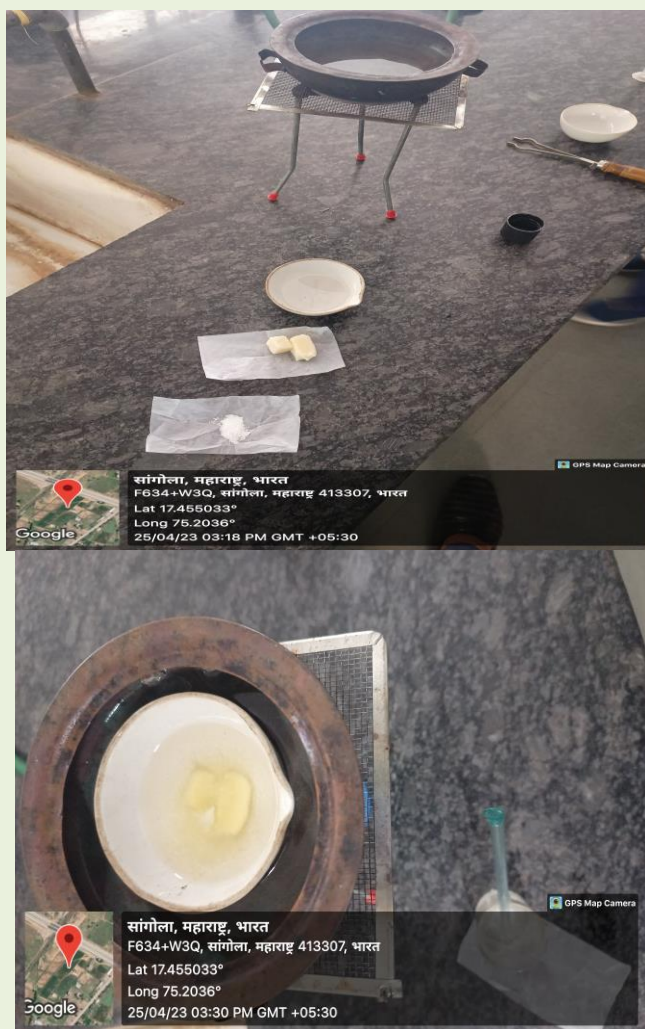


**Fig no 6. Rose water**

**METHODS OF EXPERIMENT**

Formulation preparation: An emulsion of oil and water (O/W) is used to make this cream. Liquid paraffin, emulsifying bees wax, and other oil-soluble ingredients were dissolved in the oil phase (part A), which was then heated to 60°C. [20, 21]

The aqueous phase (part B) was heated to 60°C while the preservatives (methyl paraben and propyl paraben) and other water-soluble components (borax) were dissolved in it. [20,21] After heating, the oil phase was gradually filled with the aqueous phase, and the mixture was constantly swirled until the emulsifier cooled



**Fig no 7. Preparation of cream**

**Formulation Table no: 1**

The cream's recipe is provided in Table:

Sr.	Ingredient	Quantity Given for 100gm	Quantity Taken for 50gm	Role of ingredients
1.	Bee's wax	16g	8g	Emollient
2.	Liquid paraffin	50g	25g	Emollient
3.	Borax	0.8g	0.4g	Emulsifying agent
4.	Water	30g	15g	Vehicle
5.	Methyl paraben	0.18g	0.09g	Preservative
6.	Propyl paraben	0.02g	0.006g	Preservative
7.	Azadirachta Indica leaves extract	3ml	1.5ml	Antimicrobial
8.	Perfume (Rose water)	Q.S.	Q.S.	Essences

**EVALUATION TESTS:****Physical properties:**

Colour : faint green

Odour: perfumed smell

**Homogeneity:**

By looking at it and touching it, uniformity tests were conducted on the formulation. Homogeneity and heterogeneity are concepts used to describe how uniform a material, process, or image is.[18] Heterogeneous features are noticeably nonuniform in at least one of these attributes; homogeneous qualities are consistent in composition or character and include color, shape, size, weight, height, distribution, texture, language, wealth, sickness, temperature, radioactivity, architectural design, etc. [15, 18, 19].

**pH Evaluation:-** The formula's pH was determined with a pH meter. First, a neutral buffer standard (pH 7.01) and an acidic buffer solution (pH 4.01) are used to calibrate the electrode in

advance. the electrode follows. It is submerged in a preparation for a nano emulsion. The instrument records the pH value that is mentioned there. A room temperature was used for the measurements. <sup>14,15</sup>



**Fig no 8 .pH evaluation**

A topical preparation's pH should fall between 4.5 to 6.5, which is the pH range that corresponds to the skin's pH. The pH shouldn't be too alkaline or too acidic because either one might irritate your skin. [14,15]

#### **Determining Viscosity:-**

A Brookfield viscometer was used to measure the formula's viscosity at room temperature (28°C–20°C). Following the introduction of the formula into a beaker glass until it reached a 100ml capacity, the spindle was lowered until the spindle border was submerged in the preparation.



**Fig no8. Brookfield viscometer**

The third spindle is being utilized. Then, by depressing the on button, the viscometer was switched on. The spindle speed is then adjusted to the appropriate rpm (30 rpm). After the red moving needle has stabilized, read the scale (dial reading). The dial reading is multiplied with the correction factor to get the viscosity value in centipoise (cps).

#### **Spread ability test:**

When a cream is applied to skin or an affected area, the term "spread ability" describes how quickly it spreads to that area. A cream's spreading capacity influences both its bioavailability and efficacy. How quickly two slides operating under a particular load separated from the cream positioned in between the slides served as a measure of spread ability. Faster separation of the two slides leads to better spread ability [30,31]. Glass slides with constant diameters were chosen from two sets. The cream mixture was placed on one of the slides. There was the extra slide on top of the cream. In order to place the cream, align it along the slide 6.0 cm away from the opposite slide.<sup>19</sup>

By adding gramme weight to the top slides, the cream between them was uniformly pressed to create a thin layer. When the weight was taken off the slides, the excess cream that had been adhering was scraped off [29]. The two slides were tightly tied to the stand so that not even the smallest amount of movement could be made; the weight attached to the upper slide was the only one that could be released. To firmly fix the upper slide, a 20 g weight was utilized. After 6.0 cm, the top slide lifted under the weight's force and split off from the bottom slide.<sup>7</sup>

The following formula was used to determine spread ability:

$$S = m * 1/t$$

Were,

S - Spread ability

m - Weight tied to the upper slide (20gm)

l - Length of the glass (6 cm)

t - Time taken in seconds.

### **Skin irritation test:**

After being shaved, rabbits are used to test acute skin irritancy in real time. After the product has been administered to the skin, oedema and/or erythema are assessed after 1, 24, 48, and 72 hours. Products can be categorized using the rating method from least irritating to most irritating.

There are a few in vivo models that can be used instead of the Draize test. Some of these employ animals from other species, such guinea pigs, mice, and rats. There are 14 substitute parameters for erythema and oedema. The first skin irritancy test was conducted on albino rats weighing 150–200 grams. The animals were maintained with water and standard animal diet. own unrestricted, free access to water. Standard lab conditions were followed for housing the

animals [30, 31]. The entire quantity was divided into four groups, each containing seven animals. Two batches of each were given to the test and control groups. The rats' dorsal hairs were clipped by researchers one day before to the trial's commencement. Animals with normal skin texture were kept separately in cages equipped with copography meshes to keep them from coming into contact with the bedding.<sup>9,10</sup>

As per the regulations the use of animals require permission from government for experiment so the test is performed on human skin as the formulation is not toxic and irritating it doesn't show any side effects.



**Fig no 9.Skin irritation test:**

### Observations

Sr. no.	Evaluation parameters	Observations
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1.	Colour	Faint green
2.	Odour	Perfumed odour
3.	pH	Neutral
4.	Viscosity	849cp
5.	Spread ability	Spreadable on Skin
6.	After feel	Good feel
7.	Skin Irritation test	No irritation

## RESULT AND DISCUSSION

Acne is the disease condition in which the irregular secretion of the sebaceous gland and other skin secretion takes place accordingly. For the treatment of this acne the method adopted is antibacterial activity of azadirachta Indica.

The prepared herbal formulation of the azadirachta Indica cream is prepared as of the oil in water type of emulsion that appear as the greenish white coloured product with good odour, irritation, and the viscosity. Every parameter was tested for the quality and safety. The product is finalized with the ability of its antibacterial activity for the treatment of acne.<sup>22</sup>

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