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EVALUATION OF HERBAL CRUDE DRUGS FOR ANTI-ACNE CREAM: BEETROOT, POMEGRANATE & ALOVERA

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ABSTRACT

Acne by definition is multifactorial chronic inflammatory disease of pilosebaceous units. Propionibacterium acnes and staphylococcus epidermidis are considered as the major skin bacteria that cause the formation of acne. Although acne does not pose serious threat to general health, it is one of the most socially distressing conditions especially for adolescents. Acne vulgaris is a common human skin disease characterized by areas of skin with seborrhoea (scaly red skin), comedowns (blackheads and whiteheads), papules (pinheads), nodules (large papules), pimples and possibly scarring. Demand of herbal formulations has been continuously growing in the world market. The present work deals with the preparation and evaluation of the anti-acne cream containing hydroalcoholic extract of pomegranate (Punica granatum, puniaceae). The plant has been reported in the literature having good anti-microbial, antioxidant and anti-inflammatory activity. Red beetroot is well known for its high proportion of battalions, with great potential as functional food ingredients due to their health-promoting properties.

KEYWORD: Anti-inflammatory, natural formulation, antioxidant, antimicrobial activity.

INTRODUCTION:

Acne by definition is multifactorial chronic inflammatory disease of pilosebaceous units. Although acne does not pose serious threat to general health, it is one of the most socially distressing conditions especially for adolescents. Acne vulgaris is a common human skin

disease characterized by areas of skin with seborrhoea (scaly red skin), comedones (blackheads and whiteheads), papules (pinheads), nodules (large papules), pimples and possibly scarring. Demand of herbal formulations has been continuously growing in the world market. The present work deals with the preparation and evaluation of the anti-acne cream.

FUNCTIONS OF SKIN-

1. Protection from war and tear:

The skin varies in thickness according to the amount of friction and pressure to which it is subjected on the eyelids it is about Imm thick, while on the palms of the hands and soles of the feet it can be up to 1cm. The toughness of skin is due to the amount of the insoluble protein keratin within it. There is little or none where the skin is not subject to friction (for example, inside the lips) and more where the skin is subjected to constant
external pressure. Subcutaneous fat beneath the skin acts as a shock absorber and helps to protect the body from trauma.

2. Protection against infection and chemicals:

Although large numbers of micro-organisms live on the skin, these cannot break the barrier created by intact healthy skin. Trauma to the skin creates an opportunity for invasion by microorganisms and results in an inflammatory response characterised by redness, swelling, localised heat, pain and pyrexia. Blood flow increases and transports white blood cells and macrophages to the site of injury to fight infection and repair the tissue. The skin also provides protection against weak chemicals and most gases.

3. Protection against ultraviolet:

The skin protects the body from harmful UV rays. The pigment melanin is produced in special cells called melanocytes, which are found at the base of the epidermis. Melanin production is influenced by sunlight. When skin is over exposed to the sun's rays, it becomes red with erythema (flushing of the skin in response to dilatation of blood vessels in the dermis) due to inflammation. The skin then turns brown as melanin is produced. Melanin absorbs UV light and prevents it damaging cellular DNA Hair, made of keratin, also helps to protect people from UV light as well as from extremes of temperature and trauma.

4. Maintaining body temperature:

The body can survive environmental changes in temperature ranging from-52°C to +49°C. Maintaining a constant core body temperature (37°C) is an important function of the skin and

this regulation is essential for the normal functioning of cellular enzymes throughout the body. The hypothalamus, which contains the temperature regulating centre, can orchestrate a number of changes within the skin in response to temperature changes.

i) Response to increased temperature:

Arteries and veins in the subcutaneous layer immediately beneath the dermis are linked to small arterioles and capillaries, which supply blood to the dermis. Blood flow can be varied by dilatation and constriction of these dermal blood vessels. Blood flow to the skin can vary from about 250ml/min to 31/min in response to the need to lose or conserve heat. When the body's core temperature rises, blood vessels in the dermis dilatate and the skin becomes warm to the touch, and pink or red in colour. The blood carries heat with it to the skin surface.

Heat is lost from the body in four ways:

- Convection: Heat is lost to air currents, for example, when a fan is used to cool a patient
- Conduction: Heat is lost to cooler solid objects which are in direct contact with the skin
- Radiation: Heat from a warm body is lost to the cooler surrounding air.

ii) Response to a fall in temperature:

In cold weather, blood supply to the skin is reduced, as is sweat production. This conserves heat in the deeper organs, which are also insulated by the layers of subcutaneous tissue and fat. Another method used in the skin to conserve heat is the mechanism that erects the body's hair. Tiny arrector pili muscles, around the shaft of the hair, contract and pull the hat vertically Shivering occurs when the body becomes cold - this involuntary muscle action throughout the body is a metabolic process, which produces heat.

5. Receiving stimuli from the outside world:

The skin is the body's largest sensory organ and its sensory (or afferent) nerve receptors detect a number of

different stimuli: mechanical, such as pressure or stretching; and thermal, in terms of heat and cold. This ability to sense and provide information about contact of the skin with the outside world allows the brain to interpret and act upon the stimuli and helps to protect the body and avoid damage to it.

CLEANSING AND CARE NEEDS FOR FACE SKIN:

TYPES OF ACNE

1. Combination:

- Combination of oily and dry skin
- T-zone: Forehead, nose, and chin are oily
- Cheeks tend to be dry

2. Dry:

- May have dry, flaky skin
- Eczema prone
- Sometimes itchy

3. Oily:

- Prone to acne and breakouts
- Shiny skin

FACE CARE SUGGESTIONS-

1. Face cleanser:

- Combination: Mild cleanser
- Dry: Gentle or creamy cleanser
- Oily: Oil-free, non-comedogenic (does not block pores) foaming cleanser that contains salicylic acid or benzoyl peroxide.

2. Moisturising:

- Combination: Medium-weight moisturizer with broad-spectrum sunscreen
- Dry: Moisturizer with broad-spectrum sunscreen applied right after washing face while face is still damp
- Oily: Lightweight and non-comedogenic (does not block pores) that contain broadspectrum sunscreen; there are oil-free moisturizers and broad-spectrum sunscreens that may be used.

Types of Acne:

- Whiteheads. Also known as "closed comedones," whiteheads are one of the most typical forms of acne
- Blackheads
- Pustules

The following factors may increase your risk for developing acne:

Hormone: An increase in androgens, which are male sex hormones, may lead to acne. These increase in both boys and girls normally during puberty and cause the sebaceous glands to

enlarge and make more sebum.

Hormonal changes related to pregnancy can also cause acne.

Family history: Researchers believe that you may be more likely to get acne if your parents had acne.

Medications: Certain medications, such as medications that contain hormones, corticosteroids, and lithium, can cause acne.

Age: People of all ages can get acne, but it is more common in teens

Causes of Acne:

- Hormones
- When androgens rise in both boys and girls during puberty, the sebaceous glands under the skin enlarge and produce more sebum or oil
- Heredity
- Oil-based beauty products
- Stress and Anxiety
- Medications
- Diet
- Pimple popping
- Symptoms of Acne:
- Crusting of skin bumps
- Cysts
- Papules (small red pumps)
- Redness around the skin eruptions

Uses:

Anti-acne creams are designed to help treat and prevent acne breakouts. They typically contain active

ingredients that target the underlying causes of acne, such as excess oil production, clogged pores, and bacterial growth. Here are some common uses of anti-acne creams:

1) Treating Acne Breakouts: The primary use of anti-acne creams is to reduce and treat existing acne, including blackheads, whiteheads, pimples, and cysts.

2) Preventing Future Breakouts: Many anti-acne creams contain ingredients like benzoyl peroxide, salicylic acid, or retinoids, which can help prevent new acne from forming by keeping pores clear and reducing oil production.

3) Reducing Inflammation: Some anti-acne creams contain anti-inflammatory ingredients that

can reduce redness, swelling, and irritation associated with acne lesions.

4) Promoting Skin Renewal: Ingredients like retinoids and alpha hydroxy acids (AHAs) promote the turnover of skin cells, which helps prevent clogged pores and can improve the appearance of acne scars over time.

5) Targeting Bacteria: Certain anti-acne creams contain antibacterial agents like benzoyl peroxide, which can kill the bacteria (P. acnes) that contribute to acne development.

6) Minimizing Scarring: Over time, regular use of anti-acne creams can reduce the appearance of acne scars, though more advanced treatments may be necessary for severe scarring.

Aim and Objectives:

Aim: To study formulation and evaluation of anti-acne cream using Beetroot , Pomegranate & Alovera.

Objectives:

- Visibly reduced pimples.
- Improve skin
- Reduce redness and skin irritation
- Skin appearance clear
- Preparation of palatable formulation

METHODOLOGY:

Sr. no	Title
1.	Selection of drug
2.	Crude drug profile
3.	Material & method
4.	Experimental work
5.	Evaluation of anti-acne cream
6.	Result
7.	Reference

Experimental work-

1. **Collection of Beetroot-**

Beetroot was collected from the local markets of Pune.

Extraction-

List of ingredients used in extraction:

List of apparatus:

Soxhlet Apparatus-

Principle of Soxhlet Extraction-

Soxhlet extractor extracts the components using the condensed vapours of the solvent. The condensed vapours come in contact with the sample powder and the soluble part in the powder gets mixed with the solvent.

Soxhlet Apparatus

Working-

• First, we turn on the heat and the metal plate get heated.

• The RBF which contains our solvent starts boiling.

• The vapours from the RBF travel from RBF to the condenser via the distillation tube.

• The condenser condenses the vapours of solvent and those condensed vapours fall down to thimble.

• We put our sample powder inside the thimble. The thimble has to be covered from the bottom with a cotton ball to avoid powder directly falling into the thimble. And also cover the powder from the top.

• So, when the condensed vapours fall into the thimble, the powder gets wet with the solvent

and the components which are soluble in the solvent gets along with it.

• Siphon connects the thimble to RBF as we saw earlier. The solvent mixture starts filling thimble and siphon. A point reaches where the siphon starts overflowing under the influence of gravity.

• Since, the siphon directly connects RBF, the overflowed liquid falls back to RBF. This marks the first cycle.

• As I mentioned earlier, we can perform as many cycles as we want.

• One thing to mention is we don't change the solvent for every cycle. And despite that, when the solvent vaporizes, the components from the sample do not get vaporized. So, each time we get 100% pure solvent vapours.

• When we think that we have exhausted the sample sufficiently, we stop the cycles. Now we are left with the mixture of solvent and the components from the sample which are soluble in the solvent.

• Now, we can separate them by further procedure.

Advantages-

• Efficient and continuous extraction.

• It needs less solvent to yield concentrated extract.

• We can continue the process until the powder gets completely exhausted due to which extraction efficiency is much greater than the traditional extractor.

• We can use modified Soxhlet extractors to meet different needs and increase efficiency further.

• By modifying certain thing, we can use the Soxhlet extractor on the industry level.

Disadvantages-

• Extraction by Soxhlet is only possible with boiling solvents or azeotropes.

• The desired components must be soluble in the solvent at a high temperature.

• We cannot extract from more than one sample at a time.

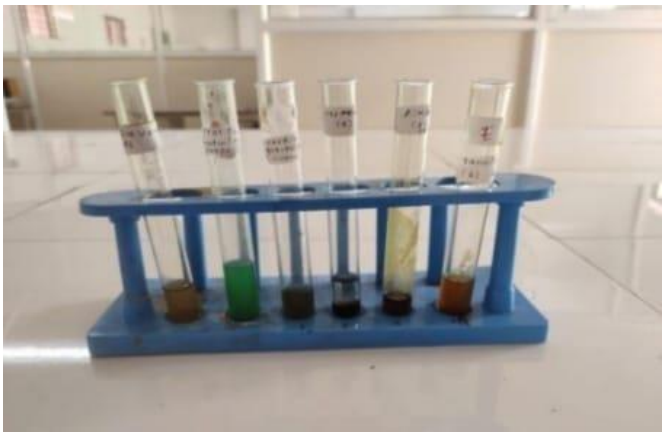
Procedure for extraction of Beetroot-

The extraction procedures were carried out on Soxhlet apparatus with 50 grams of coarse powder of the beetroot using water for 8 hrs and filter. The concentrated extract was then evaporated to dryness with the help of electronic water bath at temperature 60 c. the dried extract was stored at 4 c in air free sterile container in refrigerator for preliminary phytochemical analysis.

Alkaloid	+
Tannins	+
Flavonoids	+
Carbohydrates	+
Saponin	+
Cardiac glycoside	+

Beetroot extract

Phytochemical test for Beetroot –



Sr.no	**Ingredients**
1.	Coarse powder of Pomegranate
2.	Distilled water

Sr.no	Apparatus
1.	Container
2.	Beaker
3.	Measuring Cylinder
4.	Funnel
5.	Stirrer/ Agitator
6.	Filter Paper

2. Collection of Pomegranate

Pomegranate was collected from the local market of Pune.

Extraction:

List of ingredients used in the extraction List of Apparatus:

Maceration:

Maceration, a common extraction method, involves soaking plant material, like pomegranate peels, in a solvent (e.g., methanol, ethanol, water) at room temperature or slightly elevated temperatures. This process allows the solvent to penetrate the plant cells and dissolve the desired bioactive compounds.

Procedure:

Maceration Process for Pomegranate Extraction.

1.Preparation :

Alkaloids	+
Flavonoids	+
Tannins	+
Saponins	+
Glycosides	+
Tannins	+

Pomegranate peels are typically ground or crushed to increase surface area for solvent penetration. The peels can be dried before grinding.

2. Soaking:

The ground or crushed peels are placed in a container with the chosen solvent (e.g., methanol, ethanol, or water).

3. Agitation and Temperature:

The mixture is stirred or agitated at room temperature or a controlled temperature (e.g., 37°C) for a specific duration (e.g., 24 hours, 48 hours).

4. Solvent Evaporation (if needed):

After maceration, the solvent may need to be evaporated using a rotary evaporator or similar methods to obtain a concentrated extract.

5. Optional Steps:

The extract may be further purified or concentrated through techniques like lyophilization (freeze-drying) or liquid-liquid extraction.

Phytochemical test for Pomegranate:

Sr. No	Ingredient	Quantity For F1	Quantity For F2	Quantity For F3	Quantity For F4
1	Beetroot extract	2.5 gm	2.5gm	2.5gm	2.5gm
2	Pomegranate extract	2.5 gm	2.5gm	2.5gm	2.5gm
3	Tween-80	4ml	6ml	8ml	2ml
4	Methyl paraben	0.2 gm	0.2 gm	0.2 gm	0.2 gm
5	Mineral oil	14ml	9ml	16ml	19ml
6	Beeswax	1gm	2gm	1.5gm	0.5gm
7	Distilled water	QS	QS	QS	QS

LIST OF INGREDENTS:

List of ingredients is as follows:

- ❖ Pomegranate Extract
- ❖ Beetroot Extract
- ❖ Triethanolamine
- ❖ Methyl Paraben
- ❖ Water
- ❖ Mineral Oil
- ❖ Beeswax
- ❖ Rose Water

List of Apparatus:

Sr.no	Apparatus
1.	Heating Mantle
2.	Beaker
3.	Measuring Cylinder
4.	Water Bath
5.	Stirrer
6.	China Dish

3. Collection and extraction of alovera.

Collection of Alovera

Alovera was collected from the local markets or local nurseries .

Soxhlet Apparatus-

Principle of Soxhlet Extraction-

Soxhlet extractor extracts the components using the condensed vapours of the solvent. The condensed vapours come in contact with the sample powder and the soluble part in the powder gets mixed with the solvent.

As with the water extraction method, about 10 to twenty grams of defatted dry powder changed into extracted with the aid of using Soxhlet with two hundred ml of 65% ethanol because the extraction solvent till the tissue changed into absolutely depleted at 65°C. Defatted aloe vera leaf powder is first-rate soxhlet extracted with 65% ethanol till absolutely depleted. Therefore, the extract received after the soxhletion gadget is subjected to solvent evaporation to acquire the extract withinside the shape of crystals, suspension or paste. This is finished with the aid of using taking the solvent-containing extract right into a beaker and setting it in a boiling water bath.

The materials are saved in a barrel of boiling water till the extraction solvent absolutely evaporates. Therefore, the plant extracts received can then almost be used for the assessment of phytochemical extraction performance, assessment of sensory properties, phytochemical assessment and numerous natural or pharmacological studies.

Working-

- First, we turn on the heat and the metal plate get heated.
- The RBF which contains our solvent starts boiling.
- The vapours from the RBF travel from RBF to the condenser via the distillation tube.
- The condenser condenses the vapours of solvent and those condensed vapours fall down to thimble.

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Advantages-

• Efficient and continuous extraction.

• It needs less solvent to yield concentrated extract.

• We can continue the process until the powder gets completely exhausted due to which extraction efficiency is much greater than the traditional extractor.

• By modifying certain thing, we can use the Soxhlet extractor on the industry level.

Disadvantages-

• Extraction by Soxhlet is only possible with boiling solvents or azeotropes.

• The desired components must be soluble in the solvent at a high temperature.

• We cannot extract from more than one sample at a time

Procedure for extraction of alovera:

The extraction procedures were carried out on Soxhlet apparatus with 50 grams of coarse powder of the beetroot using water for 8 hrs and filter. The concentrated extract was then evaporated to dryness with the help of electronic water bath at temperature 60 c. the dried extract was stored at 4 e in air free sterile container in refrigerator for preliminary

phytochemical analysis.

Soxhlet extraction of Aloe vera gel involves drying and pulverizing the gel, followed by continuous hot percolation with a solvent (typically 65% ethanol or methanol) for several hours to days. The process uses heat to vaporize the solvent, which condenses and fills the thimble containing the sample, extracting bioactive compounds, such as acemannan, before returning to the flask.

FORMULATION CONSIDERATION FOR ETHNIC NEEDS OF COSMECEUTICALS:

Ingredients used in skin cream include:

1. Water:

One of the most widely used raw materials in the manufacture of cream is water. In cosmetics water is used as solvent for many ingredients of cosmetics. Water should be either deionised or distilled, if it has to be incorporated in cream formulations.

2. Oil, Fates and Waxes:

Oil, fats and waxes and derivatives therefrom comprise an essential portion of creams. Oil may be of two types: mineral and glyceride.

3. Colours:

Colouring agents is infact, a generic term for any colour imparting substances. Most of natural colours have been replaced by coaltar colours so far as cosmetics are concerned. A few of the natural colours might still to be used. Examples of natural colours used in cosmetics are saffron, chlorophyll, cochineal.

4. Emollients:

Emollients, also commonly referred to as moisturizers, are products that help to soften skin or to treat skin that has become dry. They work by increasing the ability of the skin to hold water, providing the skin with a layer of oil to prevent water loss, and lubricating the skin.

5. Emulsifying Agents:

a) **Inorganic Solid:**

Inorganic solid which forms emulsion include bentonite, colloidal, kaolin, hydrated lime or magnesia and other clay. When dispersed with water, their colloidal properties permit the formation of emulsion in water.

b) **Gums and Proteins:**

Gums and proteins are used as emulsifying agent. These include gum tragacanth, karaya gum, gum Arabic, agar-agar, irish moss, alginate pectins, saponins, gelatin, casine, methyl cellulose and egg albumin.

6. Wetting Agent:

Wetting agents are basically a type of surface active agents. These include soap, sulfonated oils, fatty alcohols, sulfates, sulfated fatty esters and amides, secondary alcohol sulfates and aryl alkyl sulfates.

7. Humectants

Humectants (or moisturizers) are important cosmetic ingredients allowing to prevent loss of moisture thereby retaining the skin's natural moisture. Some compounds also have the ability to actively attract moisture. There is a large variety of very different compounds providing moisturizing effects including proteins, acids, polysaccharides, and various small molecules (e.g. glycerine, sorbitol, urea, aloe vera, olive oil, honey, babassu oil, grape seed oil, avocado oil, etc).

8. Perfumes:

Perfume is a substance that imparts a scent or odour, including a sweet and pleasant smell.

Ideal Properties of Cream:

- Non-toxic
- Possess small
- Non irritating
- Non sticky
- It should be physically and chemically stable

CONCLUSION:

Pomegranate (Punica granatum) and beetroot (Beta vulgaris) are promising natural ingredients for the formulation of anti-acne cream due to their rich phytochemical composition and therapeutic properties. Pomegranate contains potent antioxidants such as polyphenols and flavonoids, along with antibacterial and anti-inflammatory activities that help in reducing acne-causing microorganisms and skin inflammation. Beetroot, on the other hand, is rich in vitamins, minerals, and betalains, which contribute to skin nourishment,

detoxification, and improved complexion.

The synergistic effect of these natural extracts enhances their efficacy in controlling acne, reducing oxidative stress, and promoting skin healing without the adverse effects commonly associated with synthetic agents. Their incorporation into topical formulations provides a safer, cost-effective, and herbal alternative for acne management.

Thus, pomegranate and beetroot can be effectively utilized as crude drugs in the development of anti-acne creams, supporting the growing demand for natural and herbal skincare products.

RESULT:

The formulated anti-acne cream containing extracts of pomegranate (Punica granatum) and beetroot (Beta vulgaris) was evaluated for various physicochemical and biological parameters.

The formulation showed a smooth texture, good spreadability, and homogeneity, indicating suitability for topical application. The pH of the cream was found to be within the skin-compatible range (5.5-6.5), ensuring minimal irritation upon use. The cream exhibited good consistency and stability with no phase separation observed during the study period.

Phytochemical screening confirmed the presence of flavonoids, phenolics, and antioxidants, which are responsible for antimicrobial and anti-inflammatory activities. The formulation demonstrated effective antibacterial activity against acne-causing bacteria (such as Propionibacterium acnes), indicating its potential in acne treatment.

Additionally, the cream showed good skin compatibility with no signs of redness, irritation, or sensitivity, suggesting it is safe for topical use. The presence of beetroot contributed to improved skin appearance and mild pigmentation enhancement, while pomegranate extract aided in reducing inflammation and bacterial growth.

Overall, the results indicate that the formulated herbal anti-acne cream is stable, effective, and suitable for managing acne naturally.

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