



FORMULATION AND EVALUATION OF ANTIBACTERIAL HERBAL CREAM USING POMEGRANATE PEEL EXTRACT

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ABSTRACT

The Punica granatum L. plant's fruits have been extensively studied for their diverse medicinal advantages, encompassing wound healing, anti-inflammatory, and antibacterial properties. Combining herbal extracts may enhance therapeutic effects compared to individual extracts. Cream is defined as semisolid emulsions which are oil in water (o/w) or water in oil (w/o) type and these semisolid emulsions are intended for external application. This study aims to formulate and evaluate a topical herbal cream with antibacterial and anti-oxidant property from pomegranate peel extract. Various parameters such as organoleptic properties, pH, stability study, spreadability, consistency and homogeneity are scrutinized for the herbal cream. The extraction is carried out using a particular device known as the Soxhlet apparatus. The apparatus comprises of an extraction chamber linked to a vapor duct and a siphon tube that continues down to the joint, where a circular bottom shell may be attached. The Soxhlet extraction method is use to extract the phytoconstituents of the respective plants.

Keywords: Herbal cream, Pomegranate Peel Extract, Almond Oil, Cosmetic Formulation, Anti-bacterial, Antioxidant, Soxhlet Apparatus, Extraction.

1. INTRODUCTION

Cream is classified as oil in water and water in oil emulsion. It is applied on outer part or superficial part of the skin and its main ability is to remain for a longer period of time at the site of application. The function of a skin cream is to protect the skin against different environmental condition, weather and gives soothing effect to the skin. There are different types of creams like cleansing, cold, foundation, vanishing, night, massage, hand and body creams. The main aim of our work is to develop herbal cream which can give multipurpose effect, like moisturizer, reduce acne and skin irritation, reduce skin diseases like eczema, psoriasis, dry skin, wrinkles, rashes etc. and also adding glow to the face. We have used some herbal ingredient in our preparation which is Pomegranate, Aloe vera and almond oil. The 2 pomegranate peel is used as

an anti-bacterial and anti-oxidant and it is also used to reduce aging, redness and itching of the skin. The aloe vera is used as moisturizer, anti-aging and antiinflammatory agent. The herbal cosmetics are natural cosmetics. Herbal cosmetics are used differently cosmetic ingredients create a base in one or more herbs ingredients are used for the development of new pharmaceutical products for cosmetics drugs uses. Contains herbal cosmetics which herbs are used in raw or juice form. Nowadays, the use of herbs in cosmetic production in personal care has increased exponentially and there is a high demand for herbal cosmetics. Cosmetics should be used on the human body for cleansing, Beautifying, promoting glamor and changing the look without affecting the body structure or functions. Cosmetics are associated with hunting, fighting, religion and superstition and later with medicine. Various synthetics Compounds, chemicals and dyes have been shown to cause a variety of skin diseases with a variety of side effects. Thus, we use the herb Cosmetics as much as possible. The basic idea of skin care cosmetics is deep in Ayurveda and Unani and Homeopathy system. Herbs should have various properties such as anti-oxidant, anti-inflammatory, antiseptic, emollient, seborrhic, such as anti-karyolitic activity and anti-bacterial, etc. Cosmetics are made to reduce wrinkles, fight acne and control oil secretion, for various skin diseases formulas like skin care, sunscreen, anti-acne, anti-wrinkle and anti-aging are designed using different ingredients natural or artificial. The beauty of skin and hair of individuals depends on health, habits, regular work, climate etc. Extreme heat can dehydrate in the summer and cause wrinkles, blemishes and blemishes on the skin Pigment. Severe winter damages the skin in the form of cracks, cuts, spots and infections. Cosmetics is a collection of a wide variety of products and products including creams, perfumes, lotions and washes. Wide range of products, and decorative cosmetics or cosmetics. Natural ingredients are widely used in the preparation there is always a growing interest in understanding the way cosmetics work and many other things. The demand for this specialty has increased significantly as a result of recent corporate scandals. And no side effects. The best thing about herbal cosmetics is that it is completely made up of herbs and shrubs, hence there are no side effects. The natural ingredients of herbs do not cause any side effects in the human body but provide nutrients to the body and Other Useful Minerals. Botanical extracts that promote health, structure and integrity widely used in leather and hair business cosmetics Formulas. Plant product from this extract made, traditional "cosmetics" have a long history in use, the term has a recent origin. The pomegranate and aloe vera were produced from a local market and garden in Raipur. All other chemicals were purchased from various sectors

2. MATERIALS AND METHODS

2.1 MATERIALS

(I) Beeswax:

Beeswax is a natural substance produced by honeybees and used in a variety of products, from cosmetics to candles. Its unique properties and composition make it a popular ingredient in many formulations.



Figure 1: Beeswax

Properties and Uses:

- **Emollient:** Beeswax is a good emollient, making it useful in skincare products for moisturizing and protecting the skin.
- **Barrier:** Its hydrophobic nature makes it effective in creating barriers in cosmetic and pharmaceutical products.
- **Thickener:** In formulations like lip balms and ointments, beeswax helps to thicken and stabilize the product.

(II) Liquid Paraffin

Liquid paraffin, also known as mineral oil, is clear, colorless oil derived from petroleum. It is widely used in various applications, including cosmetics, pharmaceuticals, and industrial products.



Figure 2: Liquid Paraffin

Properties and Uses:

- **Emollient:** In cosmetics and skincare products, liquid paraffin acts as an emollient, providing moisture and forming a barrier on the skin to prevent water loss.
- **Lubricant:** It is used as a lubricant in various industrial applications due to its smooth texture and stability.
- **Pharmaceutical Use:** Liquid paraffin is used as a laxative in medicine because it can lubricate the intestines and ease the passage of stools.

(III) Borax

Borax, also known as sodium borate, is a naturally occurring mineral and a common ingredient in various household and industrial products. It is used for its cleaning, preservative, and antiseptic properties.



Figure 3: Borax

A. Chemical Formula: $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$

B. Chemical Name: Sodium borate or sodium tetraborate

C. Composition: Boron, sodium, oxygen, and hydrogen

D. Color: Typically, white or colorless **E. Odour:** Odourless

E. Odour: Odourless

Properties and uses:

- **Cleaning Agent:** Borax is widely used as a cleaning agent in laundry detergents and household cleaners due to its ability to enhance the effectiveness of other cleaning agents.
- **Preservative:** In some food and cosmetics applications, borax acts as a preservative due to its antimicrobial properties.
- **Antiseptic:** It is used in some medicinal and antiseptic formulations for its ability to inhibit bacterial growth.
- **pH Buffer:** Borax is used to maintain the pH balance in various formulations, including soaps and shampoos.
- **Industrial Uses:** It is employed in the manufacture of glass, ceramics and fiberglass, as well as in metallurgy and as a flux.

(IV) Aloe vera:

Aloe vera is a succulent plant known for its soothing and healing properties. The gel extracted from its leaves is rich in a variety of chemical constituents that contribute to its therapeutic benefits.



Figure 4: Aloe vera

Properties and Uses:

- 1. Moisturizer:** Aloe vera gel is a natural moisturizer that hydrates and soothes the skin.
- 2. Anti-Aging:** The antioxidants in aloe vera help combat oxidative stress and may reduce signs of aging.
- 3. Anti-Inflammatory:** Aloe vera can help reduce inflammation in conditions like acne.

(V) Almond oil:

Almond oil is popular natural oil extracted from the seeds of the almond tree. It is widely used in skincare, haircare and cooking due to its numerous beneficial properties.



Figure 5: Almond oil

Properties and uses:

- **Moisturizer:** Almond oil is an effective moisturizer for the skin, helping to keep it hydrated and soft.
- **Anti-Aging:** The vitamin E and fatty acids in almond oil help to reduce signs of aging, such as wrinkles and fine lines.

(VI) Pomegranate Peel Extract:

Figure 6: Pomegranate peel

Properties and Uses:

- **Antioxidant Boost:** It helps to neutralize free radicals, reducing oxidative stress and potentially preventing premature aging of the skin.
- **Anti-inflammatory Properties:** The anti-inflammatory compounds in pomegranate peel, including flavonoids and tannins, can help soothe irritated skin and reduce redness and inflammation.
- **Skin Brightening:** Ellagic acid and other phenolic compounds in the peel may help brighten the complexion and even out skin tone by inhibiting melanin production.

(VII) Sodium Benzoate: It is used as preservative for cream.

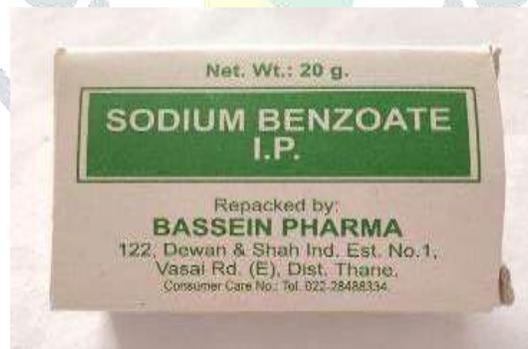


Figure 7: Sodium benzoate

2.2 METHODOLOGY**1. Collection of Plant**

Plant A: Punica granatum

Plant B: Aloe barbadensis miller

For this project, both the plants material Punica granatum and Aloe barbadensis miller were collected from local market and garden.

2. Washing and drying of the plant material

After the plants material was collected, they were carefully washed to remove any dirt, debris, or contaminants that may have been present on the surface. Fresh pomegranate peels were cleaned, washed with deionized water, sliced and dried in the sun for one week. These dried peels were crushed into form by grinder.



Figure 8: Pomegranate peel

3. Extraction of pomegranate peel

15 gm of sample (pomegranate peel) were taken into a thimble and placed in a Soxhlet apparatus 150 ml of solvent was added and extracted according to boiling point of solvent for six to eight hours. The solvent used was distilled water. After completion of extraction the dark brown extract was then cooled, crude dried extract which was turning dark brown in color.



Figure 9: Soxhlet apparatus

4. Evaluation of extract

After completion of extraction the dark brown extract was then cooled, this crude dried extract which was turning black orange in color.



Figure 10: Pomegranate peel extract

5. Formulation of cream

S.N.	Ingredient	Quantity	Role
1	Beeswax	3.2 g	Stiffening agent
2	Liquid paraffin	4.5 ml	Emollient
3	Borax	0.16 g	Emulsifying agent
4	Purified water	5 ml	Solvent
5	Pomegranate peel extract	4.5 ml	Anti-bacterial agent
6	Almond oil	5.5 ml	Moisturizer
7	Aloe vera	4.8 ml	Soother & Moisturizer
8	Sodium benzoate	0.2 g	Preservative
9	Vitamin E	1	Vitamin
10	Rose water	5 drops	Fragrance

- Melt 3.2 grams of beeswax in a heat-safe container over a hot water bath. Add 4.5 ml of liquid paraffin to the melted beeswax along with 5.5 ml of almond oil and mix thoroughly until completely blended. (Oil Phase)
- Dissolve 0.16 grams of borax in 5 ml of hot water to make a borax solution. Stir well until the borax is completely dissolved. (Aqueous phase).
- In a separate container, combine 4.8 ml of aloe vera gel with 4.5 ml of pomegranate peel extract. Stir thoroughly to ensure a uniform mixture.
- Slowly add the beeswax, almond oil and liquid paraffin mixture to the aloe vera gel and pomegranate peel extract mixture while stirring continuously to ensure proper blending.
- Gradually incorporate the borax solution into the mixture and add 5 drops of rose water, continuing to stir until the mixture is well emulsified.
- Allow the cream to cool to room temperature while stirring occasionally to maintain consistency.

- Once cooled and well-mixed, transfer the cream into a clean container for storage.

(1) **Extraction of Pomegranate peel using Soxhlet Extractor**

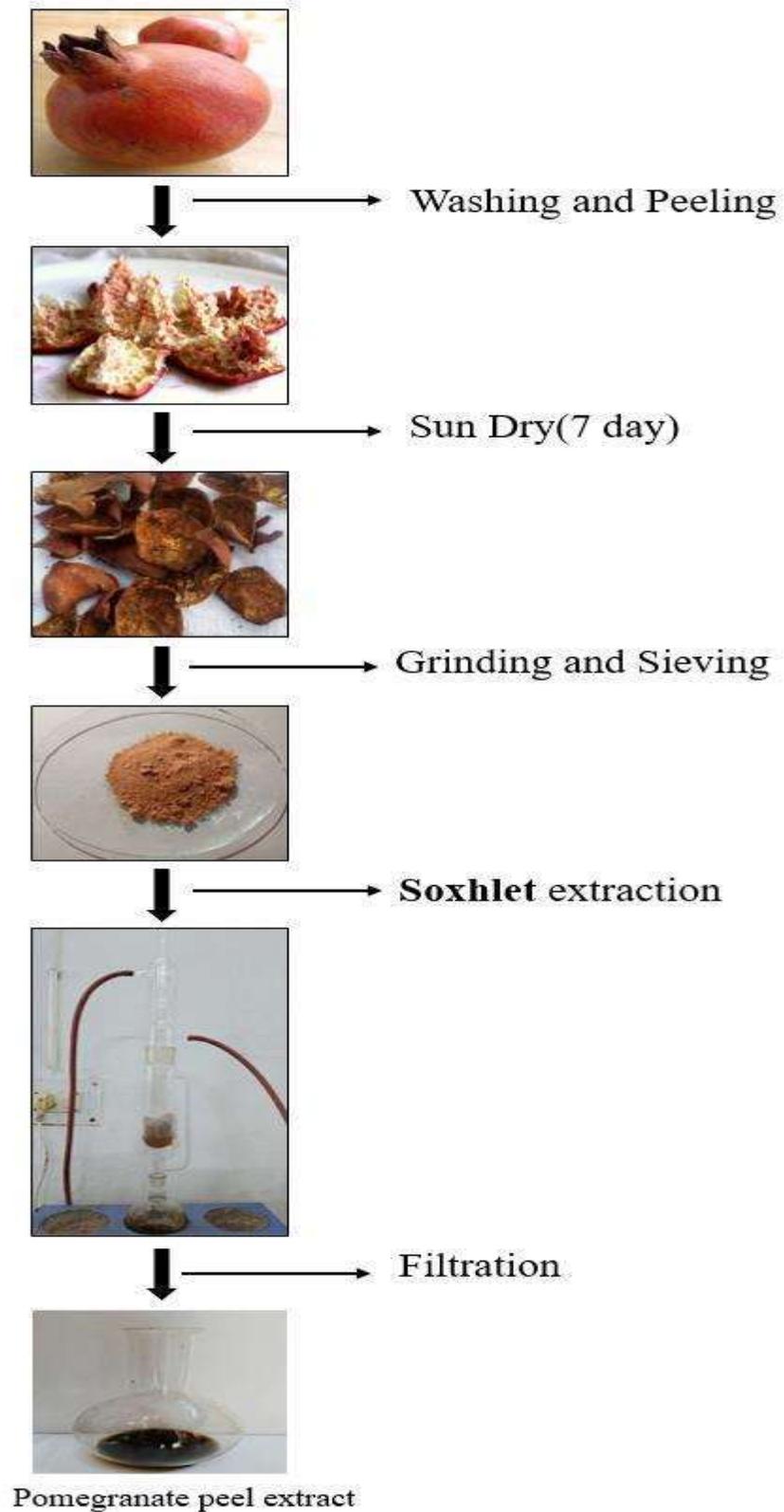


Figure 11: Soxhlet extraction of pomegranate peel

(2) Formulation of Herbal Cream

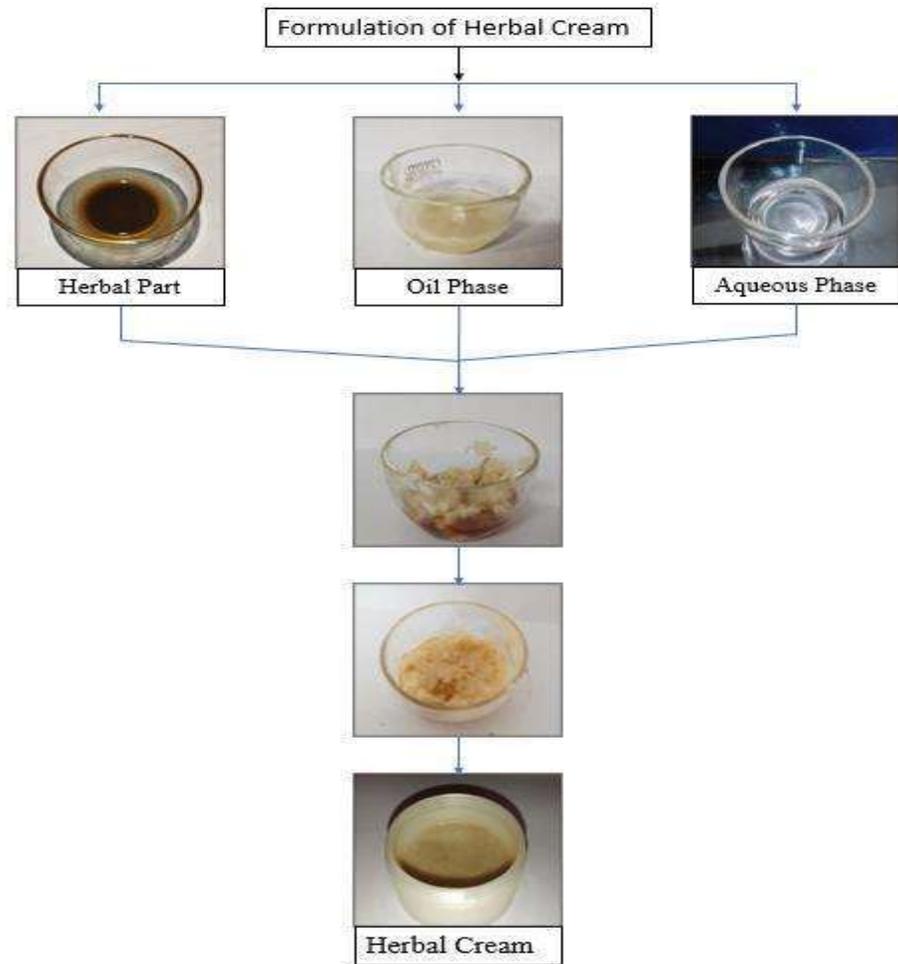


Figure 12: Formulation of Pomegranate peel extract cream

6. Evaluation of cream

- **Morphological evaluation**

This includes a visual inspection to assess the formulation's state, colour, odour and texture. Formulations of Pomegranate peel extract cream

- **Test for pH**

The pH meter was calibrated using standard buffer solution. Small amount of cream was taken and dissolve in 50 ml of distilled water and check the pH of the cream.

- **Test for spreadability**

Spread ability may be expressed by the extent of the area to which the topical application spread when applied to the affected part on the skin. .

- **Test for irritation**

Test mark an area (15 q.cm) on the left-hand dorsal surface. The cream was applied to the specified area and time was noted, irritancy, erythema, edema and swelling were checked.

- **Test for washability**

Washability test was carried out by applying a small amount of cream on the glass rod then washing it with tap water.

3. RESULT AND DISCUSSION

The result of the formulation was evaluated based on various properties, providing insights into their characteristics and stability.



Figure 13: Final Product



Figure 14: Apply on skin

1. Morphological Evaluation

It includes the evaluation of colour, odour and texture of the cream.

Parameter	Result
State	Semi-solid
Colour	Yellowish
Odour	Pleasant
Texture	Smooth

2. pH testing

pH evaluation of a cream is an important aspect of its formulation and quality control, as it influences the product's safety, effectiveness, and compatibility with the skin.

Parameter	Result
pH	7.3

3. Test for spreadability

The spreadability of a cream is an important characteristic that reflects how easily the cream spreads on the skin, which directly influences user experience and product effectiveness.

Parameter	Result
Spreadability	Pass

4. Test for stability

Stability testing is crucial in evaluating the long-term performance and safety of creams. It ensures that the product remains effective, safe and aesthetically pleasing throughout its shelf life.

Parameter	Result
Colour	No change
Odour	No change
Texture	No change
pH	No change

5. Test for irritation

Testing for skin irritation is crucial for ensuring that herbal cream is safe for use, especially on sensitive skin. Irritability tests help determine if the product causes any adverse reactions such as redness, itching, or inflammation when applied to the skin.

Parameter	Result
Irritation	Absent
Edema	Absent
Redness	Absent
Swelling	Absent

6. Test for washability

The washability test is crucial for determining how a cream performs in real-world usage, ensuring it can be easily washed off without leaving a greasy or sticky residue.

Parameter	Result
Washability	Washable

The formulated cream showed good consistency, and spreadability, homogeneity

4. CONCLUSION

The evaluation and formulation of an antibacterial herbal cream including pomegranate peel extract and aloe vera show encouraging potential for producing a useful and effective skincare product. By combining these components, the cream takes use of their complimentary qualities. The creation and assessment of an herbal cream containing pomegranate peel extract and aloe vera indicate that this combination is a good fit for antibacterial skincare product that has antioxidant, calming, and moisturizing properties.

The values of herbs in the cosmetic have been extensively improved in personal care system and to than synthetic ones. From the above study it can be conclude that the herbal cream is safe to use as it is developed from herbal extract. Natural remedies are more acceptable in the belief that they are safer with fewer side effects than the synthetic ones. So, the values of herbs in the cosmetics have been extensively improved in personal care system & there is greater demand for the herbal cosmetics nowadays. So, this formulation will be beneficial for both the parties i.e. on industrial scale and consumer scale.

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