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DEVELOPMENT AND EVALUATION OF HERBAL ANTI-PSORIATIC CREAM BY USING BOSWELLIC ACID, CURCUMIN AND ALOE VERA GEL

Dipesh I. Wadhwani*[1], Nikhil M. Pardhi[2], Harsh K. Sayam[3], Chhatrapal R. Pache[4], Mohit S. Chute[5], Bhumesh D. Yede[6]

Manohar Bhai Patel Institute of Pharmacy (B. Pharmacy) Kudwa, Gondia (MH)-441614.

***Corresponding Author: Dipesh I. Wadhwani**

Manohar Bhai Patel Institute of Pharmacy (B. Pharmacy) Kudwa, Gondia (MH)-441614.

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- **ABSTRACT**

Psoriasis is an immune-mediated inflammatory skin disease characterized by rapid skin cell growth, inflammation, erythema, scaling, and itching. Conventional therapies often cause side effects, creating a need for safer herbal alternatives. Boswellia serrata (Boswellic acid), Curcuma longa (Curcumin), and Aloe barbadensis (Aloe vera gel) possess well-established anti-inflammatory, antimicrobial, wound-healing, antioxidant, and skin-soothing properties beneficial in psoriasis management. Boswellia serrata bark and Curcuma longa rhizomes were extracted by Soxhlet extraction using ethanol. Aloe vera gel was collected from fresh leaves. **Formulation:** Three oil-in-water (O/W) cream formulations—labeled F1, F2, and F3—were developed using the fusion method. The key variation among these formulations was the concentration of active ingredients: boswellic acid ranged from 0.25g to 0.75g, curcumin also varied between 0.25g to 0.75g, while aloe vera gel remained constant at 5g across all three. The base formulation included standard excipients: stearic acid, cetyl alcohol, liquid paraffin, triethanolamine, glycerin, methyl paraben, and propyl paraben. **Antimicrobial**: Among all the formulations tested, F3 demonstrated the strongest antimicrobial activity, producing the largest inhibition zones against every bacterial strain. The measurements were: 18 ± 0.3 mm for Staphylococcus aureus, 16 ± 0.4 mm for Escherichia coli, and 15 ± 0.5 mm for Pseudomonas aeruginosa. **Anti-inflammatory:** The percentage inhibition of protein denaturation increased with higher doses, showing a clear dose-dependent relationship. F1 produced low anti-inflammatory activity at 62.4 ± 0.5%, F2 demonstrated significant inhibition at 74.8 ± 0.4%, and F3 achieved the highest effect at 86.2 ± 0.3%. Importantly, F3's anti-inflammatory potency was equivalent to that of conventional standard anti-inflammatory medications.

KEYWORDS: psoriasis, Boswellia serrata, Curcumin, Aloe vera gel, Herbal anti-psoriatic cream, Skin irritation, Spreadabity, Anti-microbial activity, Skin friendly, Herbal cosmetic, Natural cosmetic.

1. INTRODUCTION

"**Psoriasis**" is an autoimmune condition that leads to an accelerated production of skin cells, resulting in plaques, and is frequently associated with psoriatic arthritis (PsA), characterized by joint discomfort, rigidity, and inflammation. Both conditions arise from an excessively active immune response that triggers inflammation, and although there is no definitive cure, various treatments can assist in alleviating symptoms such as skin redness, scaling, and joint complications, which may involve swelling resembling sausages.[1]

Signs And Symptoms Of Psoriasis: The most typical sign of psoriasis appears as dry, raised, thick patches on the skin. These patches are usually covered with a silvery-white layer known as scale, and they commonly cause itching.

- **No cure, but treatable:** Focus on managing flares and preventing damage.
- **Treatments:** Topical creams for skin, NSAIDs, DMARDs (Disease-Modifying Antirheumatic Drugs), immunosuppressants, lifestyle changes (exercise, stress management).[1]

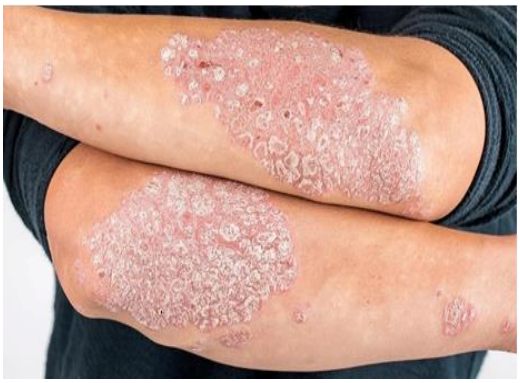


Fig. 1.1: symptoms of psoriasis.

Anti-psoriatic refers to any medication, natural remedy, or treatment method designed to reduce psoriasis symptoms and address its root causes. Psoriasis is a long-term autoimmune condition that affects the skin. Anti-psoriatic agents function through three main mechanisms: they slow down the excessive rapid production of skin cells (known as hyperproliferation), decrease inflammation, and help regulate or balance the immune system's response

- **Anti-Psoriatic Effects**

1) **Reduced Skin Lesions**: Topical formulations have shown improvement in scales and erythema (redness) in patients with mild to moderate chronic plaque psoriasis.
2) **Alleviated Joint Symptoms**: For psoriatic arthritis, oral boswellic acid supplements may help reduce joint pain, stiffness, and swelling.
3) **Decreased Inflammation**: Boswellic acids work by targeting key inflammatory pathways, such as the NF-κB pathway and the 5-lipoxygenase (5-LOX) enzyme, which reduces the production of pro-inflammatory mediators like leukotrienes and certain cytokines (e.g., TNF-α, IL-12, IL-23).[1]

1. PLANT PROFILE

1) Boswellia serrata

- **SYNONYMS**: Indian Frankincense, Salai Guggal (Hindi), Shallaki (Sanskrit), Kunduru (Telugu).
- **BIOLOGICAL SOURCE**: Its obtained from the incision of the bark of *Boswellia serrata*, belonging to family *Burseraceae*.[2]
- **DESCRIPTION:** Boswellia serrata is a medium-to-large deciduous tree known for its distinctive papery, peeling bark (grey/reddish-brown) and aromatic resin (frankincense), featuring pinnate leaves with serrated leaflets, small white flowers, and a three-ridged fruit.
- **CHEMICAL CONSTITUTENTS:** Boswellia serrata (Indian Frankincense) is rich in bioactive compounds, primarily boswellic acids (BAs), which are pentacyclic triterpenes like Boswellic acids (- - 11-keto- - acetyl-11-keto- --boswellic acid AKBA), essential oils, polysaccharides.
- **GEOGRAPHICAL SOURCE**: Hilly regions of India (Rajasthan, MP, Gujarat, Bihar), Pakistan, north Africa.

- **MEDICINAL USES**

Osteoarthritis (OA)
Rheumatoid Arthritis (RA)
Inflammatory Bowel Disease (IBD):
Asthma and Respiratory Health
Skin Health
Neurological Conditions
Cancer Support

Fig. 1.2: Boswellia Serrata.

2) Curcuma longa

- **SYNONYM:** Turmeric, Haldi (Hindi), Haridra (Sanskrit), Pasupu (Telugu)
- **BIOLOGICAL SOURCES:** Curcumin is obtained from the rhizomes of *Curcuma longa Linn*., belonging to the family *Zingiberaceae*.[3]
- **DESCRIPTION:** Curcumin is a bright yellow to orange-yellow crystalline powder with a characteristic aromatic odor and slightly bitter taste. It is practically insoluble in water but soluble in organic solvents such as ethanol, acetone, and chloroform. Curcumin is sensitive to light and alkaline conditions and shows strong coloring properties.
- **CHEMICAL CONSTITUTENTS:** Major constituents Curcumin 50-60% essestional oils 2-7% with high content bisabolane derivatives. Its also contain desmethoxycurcumin (DMC), Bisdesmethoxycurcumin (BDMC), common phytosterols, ar-tumerone, Zingiberene fatty acid, and polysaccharides.
- **GEOGRAPHICAL SOURCE:** Native to Southeast Asia; cultivated throughout India (Andhra Pradesh, Tamil Nadu, Maharashtra).

- **MEDICINAL USES**

1. Anti-inflammatory agent
2. Antioxidant
3. Anti-psoriatic
4. Antimicrobial
5. Wound healing agent
6. Used in the treatment of inflammatory skin disorders

Fig 1.3: Curcuma Longa.

3) Aloe vera

- **SYNONYM:** Aloe, Indian aloe, Ghritkumari.
- **BIOLOGICAL SOURCES:** Aloe vera consists of the dried latex and fresh gel obtained from the leaves of *Aloe barbadensis*, belonging to the family *Liliaceae* (sometimes placed under Asphodelaceae).[4]
- **DESCRIPTION:** Aloe vera is a perennial succulent plant with thick, fleshy, lance-shaped leaves having spiny margins. The inner portion of the leaf contains a clear, mucilaginous gel, while the outer leaf cells contain a yellow bitter latex. The gel is odorless, slightly viscous, and cooling in nature.
- **CHEMICAL CONSTITUTENTS:** Anthracene glycosides (11-40%), Barbaloin or Aloin, Isobarbaloin, aloe- emodin and aloesone.
- Aloinosides A and B (only in Cape aloes).
- Resis (resionotannol + cinnamic acid or coumaric acid). Also contains Aloetic acid, homonatloin etc.
- **GEOGRAPHICAL SOURCE**: Native to Arabian Peninsula; widely cultivated in tropical and subtropical regions globally.

- **MEDICINAL USES**

1. Anti-inflammatory
2. Anti-psoriatic
3. Wound healing agent
4. Moisturizing and soothing agent
5. Anti-microbial
6. Used in treatment of burns and skin irritation

Fig. 1.4: Aloe Vera.

7. MATERIALS AND EXPERIMENTAL WORK

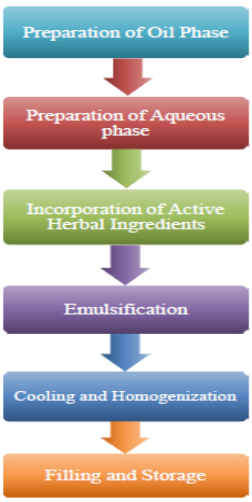
Table No. 1.1: List of Ingredients.

Sr. no.	Chemicals	Uses
1.	Boswallic acid	Anti-inflammatory
2.	Aloe vera gel	Smoothing
3.	Curcumin	Anti-inflammatory
4.	Cetyl alcohol	Stiffening agent
5.	Methyl paraben	Preservative
6.	Glycerine	Humectant
7.	Triethanolamine	Neutralizing agent
8.	Liquid paraffin	Emollient
9.	Strearic acid	Emulsifying agent
10.	Distilled water	Vehicle

Table No. 1.2: List of Equipment.

Sr. No.	Name Of Equipment
1.	Soxhlet apparatus
2.	Mortal pestle
3.	Hot air oven
4.	Hot plate
5.	Muffle furnace
6.	Baker, test tube
7.	Measuring cylinder
8.	Stirrer, porcelain dish

- **PREPARATION OF ANTI – PSORIATIC CREAM PROCEDURE**



- **Formulation of Herbal Cream**

Table No. 1.3: Formulation of Herbal Cream.

Sr.no	Ingredients	F1	F2	F3
1.	Boswellic acid	0.25g	0.5g	0.75g
2.	Aloe vera gel	5g	5g	5g
3.	Curcumin	0.25g	0.5g	0.75g
4.	Stearic Acid	2g	2g	2g
5.	Cetyl alcohol	1g	1g	1g
6.	Liquid paraffin	2ml	2ml	2ml
7.	Triethanolamine	0.3g	0.3g	0.3g
8.	Glycerine	2ml	2ml	2ml
9.	Methyl Paraben	0.05g	0.05g	0.05g
10.	Propyl Paraben	0.02g	0.02g	0.02g
11.	Distilled water	25g q.s	25 q.s	25g q.s

8. PREFORMULATION STUDIES

Boswellia serrata

- **COLLECTION**

BOSWELLIA SERRATA BARK : - It was collected from gardens.

- **EXTRACTION PROCEDURE**

A quantity of 25 grams of Boswellia serrata bark powder was added to the thimble and positioned in the Soxhlet chamber. A volume of 200 milliliters of the chosen solvent (ethanol) was poured into a round bottom flask, which was then connected to the Soxhlet extractor, and the distillation process was initiated. Once the extraction process was finished, the solvent and extractor were placed in a water bath to allow the solvent to evaporate.

Fig. 1.5: - Extraction of Boswellia serrata bark powder.

- **ORGANOLEPTIC EVALUATION**

1) **Color:** The resin typically ranges from pale yellow to yellowish-brown.
2) **Odour:** It has a characteristic, distinct balsamic fragrance (often described as woody or spicy).
3) **Taste:** The resin has a notably bitter and pungent taste.
4) **Appearance:** It is typically found as solidified tears or powder (gum resin).

***Curcuma longa* (Haldi)**

- **COLLECTION**

Curcuma longa: curcuma longa rhizome are collected from garden.

- **EXTRACTION PROCEDURE**

20gm of Curcuma longa powder was placed into the round bottom flask 250 ml of selected solvent (water) were placed in that, then the distillation process was begun in reflux condenser. After completed the extraction process, the solvent and extractor were filtered then placed on water bath to evaporate the solvent.[8]

Fig. 1.6: - Extraction of Curcuma longa.

ORGANOLEPTIC EVALUATION

- **Appearance (Color):** The rhizome surface is yellow to yellowish-brown, while the internal flesh is bright orange or orange-yellow.
- **Odor (Smell):** Distinctive, characteristic aromatic odor (often described as woody, pungent, or ginger-like).
- **Taste:** Bitter and hot/pungent, often described as having a slight peppery spice.
- **Texture/Fracture:** The rhizome is typically short, with a dense, solid, and horny fracture, sometimes exhibiting a glossy, resinous surface when cut.

Aloe vera (ghritkumari)

- **COLLECTION**

ALOE VERA GEL: It was collected from the garden.

- **Preparation of Aloe Vera Gel**

Fresh, fully mature leaves of Aloe barbadensis were collected and cleaned thoroughly under running water. The outer surface was sterilized using a 0.1% benzalkonium chloride solution. The soft, mucilaginous gel inside was then carefully removed by hand. To process the gel, it was homogenized with a high-shear mixer and passed through muslin cloth to remove any impurities. The final gel was preserved by adding 0.2% sodium benzoate to prevent degradation. The Acemannan concentration was measured using the carbazole-sulphuric acid method, yielding a content of 1.24% w/w. The freshly prepared gel had a pH value of 4.7.[9]

Fig. 1.7: Prepared Aloe Vera Gel.

❖ **CHARACTERIZATION AND IDENTIFICATION OF PLANT EXTRACT**

1. **PHYSICAL PROPERTIES:** Color, Odor, and appearances was studied.[10]
2. **SOLUBILITY STUDIES:** Solubility in benzine, hydrochloric acid and sulphuric acid was determined.

❖ **PRELIMINARY PHYTOCHEMICAL SCREENING**

A) TESTS FOR CARBOHYDRATES

a) Molisch's Test (General Test)

Procedure: To 2–3 ml of aqueous extract of face wash tablet, add few drops of α-naphthol solution in alcohol. Carefully add concentrated H_2SO_4 along the sides of the test tube. Formation of violet ring at the junction of two liquids indicates the presence of carbohydrates.

b) Fehling's Test (Test for Reducing Sugars)

Procedure: Mix 1 ml Fehling's A and 1 ml Fehling's B solution and boil for one minute. Add equal volume of test solution and heat in boiling water bath for 5–10 minutes. Formation of yellow to brick red precipitate indicates the presence of reducing sugars.

c) Benedict's Test

Procedure: Mix equal volume of Ben edict's reagent and test solution in a test tube. Heat in boiling water bath for 5 minutes. Formation of green, yellow or red precipitate indicates presence of reducing sugars.

B) TESTS FOR ALKALOIDS

a) Mayer's Test

Procedure: To 2 ml of plant extract add few drops of Mayer's reagent. Cream colored precipitate indicates presence of alkaloids.

b) Wagner's Test

Procedure: Add few drops of Wagner's reagent to the extract. Reddish brown precipitate indicates presence of alkaloids.

C) TESTS FOR FLAVONOIDS

a) Shinoda Test

Procedure: To the extract add small magnesium ribbon and few drops of concentrated HCl. Appearance of pink or red color indicates presence of flavonoids.

b) Alkaline Reagent Test

Procedure: Add few drops of NaOH solution to the extract. Intense yellow colour which becomes colorless on addition of dilute acid indicates flavonoids.

D) TESTS FOR SAPONINS

a) Foam Test

Procedure: Shake the extract vigorously with water in a test tube. Persistent stable foam formation indicates presence of saponins.

E) TESTS FOR TANNINS

a) Ferric Chloride Test

Procedure: Add few drops of 5% $FeCl_3$ solution to the extract. Blue-black or green color indicates presence of tannins.[10]

F) TESTS FOR PHENOLIC COMPOUNDS

a) Lead Acetate Test

Procedure: Add few drops of lead acetate solution to the extract. Formation of white precipitate indicates presence of phenolic compounds.

G) TESTS FOR STEROIDS

a) Liebermann–Burchard Test

Procedure: Add 2ml acetic anhydride and concentrated H_2SO_4 to the extract. Formation of blue-green color indicates presence of steroids.

H) TESTS FOR PROTEINS AND AMINO ACIDS

a) Biuret Test

Procedure: To 2 ml of extract add 1 ml of 10% NaOH solution and few drops of 0.1% $CuSO_4$ solution. Appearance of violet or purple color indicates presence of proteins.

b) Ninhydrin Test

Procedure: To 2 ml of extract add few drops of ninhydrin reagent and heat in water bath for 1–2 minutes. Formation of blue or purple color indicates presence of amino acids.

I) TESTS FOR TERPENOIDS

a) Salkowski Test

Procedure: To 2 ml of extract add 2 ml chloroform followed by carefully adding concentrated H_2SO_4 along the side of the test tube. Formation of reddish-brown color at the interface indicates presence of terpenoids.

J) TESTS FOR GLYCOSIDES (ADDITIONAL)

a) Keller–Killiani Test (Cardiac Glycosides)

Procedure: To extract add glacial acetic acid containing ferric chloride and then carefully add concentrated H_2SO_4 along the side of the test tube. Formation of brown ring at the interface indicates presence of cardiac glycosides.

- **DEVELOPMENT OF HERBAL CREAM FORMULATION**

Herbal Cream is prepared by following methods:

FUSION METHOD

The herbal cream is formulated using the Fusion Method, a widely accepted pharmaceutical technique for creating cream bases, particularly emulsion-type creams (either oil-in-water or water-in-oil). This approach involves independently melting the oil-based and water-based components, then combining them while both maintain matching temperatures.[12]

- **METHOD OF PREPARATION**

The herbal cream is formulated using the Fusion Method, a widely accepted pharmaceutical technique for creating cream bases, particularly emulsion-type creams (either oil-in-water or water-in-oil). This approach involves independently melting the oil-based and water-based components, then combining them while both maintain matching temperatures.

- **Step-by-Step Preparation Process**

Step 1: Oil Phase Preparation

- Measure and weigh stearic acid, cetyl alcohol, and liquid paraffin
- Place all components into a beaker
- Heat the mixture to 70–75°C until fully melted and homogeneous Step 2: Aqueous Phase Preparation
- Pour purified water into a separate beaker
- Incorporate glycerin along with methyl paraben and propyl paraben (preservatives)
- Heat to 70–75°C (matching the oil phase temperature)
- Add triethanolamine while stirring continuously Step 3: Emulsification Process
- Gradually pour the melted oil phase into the aqueous phase
- Use a mechanical stirrer for continuous mixing
- Keep the temperature steady at 70–75°C throughout stirring
- Continue mixing until a consistent, uniform emulsion develops Step 4: Incorporating Active Herbal Ingredients
- Allow the mixture to cool below 40°C
- Add the active components: boswellic acid,

curcumin, and aloe vera gel
- Blend thoroughly to achieve even distribution throughout the cream Step 5: Final Processing and Packaging
- Maintain stirring until the cream reaches desired thickness
- Let it cool naturally to room temperature
- Transfer the finished cream into an appropriate storage container.

9. RESULT AND DISCUSSION

1) FOREIGN MATTER TEST

Table No. 1.3: Foreign matter.

Sr. No.	Name of Ingredients	Observation
1	Boswellic acid	No foreign matters are found.
2	Curcumin	No foreign matters are found.
3.	Vera Aloe Gel	No foreign matters are found.

Fig 1.8: Foreign matter test of Boswellic acid and curcumin.

Table No. 1.5: Percentage yield of Extract of Boswellic acid and curcumin.

Sr. no.	Name of powder extracted	Percentage yield
1.	Boswellic acid	Theoretical weight = 25 gm Practical yield=2.5 gm Percentage yield =10.00%
2.	Curcumin	Theoretical weight = 25 gm Practical yield=2.0 gm Percentage yield =8.00%
3.	Aloe vera gel	Theoretical weight = 30 gm Practical yield=5.0 gm Percentage yield =16.67%

2) DETERMINATION OF LOSS ON DRYING (LOD): - Calculation

1. Curcumin: Weight of sample = 2.041 gm
Weight of porcelain dish + sample before drying = 35.627m Weight of porcelain dish + sample after 1st drying = 35.500gm Weight of porcelain dish + sample after 2nd drying = 35.496 gm Difference between LOD = sample after 1st drying – sample after 2nd drying
= 35.500 - 35.496 = 0.004gm

$$\text{LOD (\%)} = \frac{2.041-0.004}{2.041} \times 100$$
$$= 1.8\%$$

2. Boswellic acid : Weight of sample = 2.501 gm
Weight of porcelain dish + sample before drying = 58.257 gm Weight of porcelain dish + sample after 1st drying = 58.035 gm Weight of porcelain dish + sample after 2nd drying = 58.030 gm Difference between LOD = sample after 1st drying – sample after 2nd drying
= 58.035-58.030 = 0.005 gm

$$\text{LOD (\%)} = \frac{2.501-0.005}{2.501} \times 100$$
$$= 2.30\%$$

3) DETERMINATION OF ASH VALUES OF A CRUDE DRUG DETERMINATION OF TOTAL ASH VALUE

1. Curcumin
Weight of empty dish (x) = 35.906 gm Weight of dry powder taken (y) = 2.004 gm Weight of empty dish + dry powder = 37.443 gm Weight of dish + ash (z) = 36.000 gm Weight of ash = z – x gm
= 36.000 – 35.906= 0.094 gm
Total ash value of curcumin = 100(z-x)/y %
= 100(0.094)/1.537= 6.1%

2. Boswellic acid
Weight of empty dish (x) = 35.705gm Weight of dry powder taken (y) = 2.00gm Weight of empty dish + dry powder = 37.706 gm Weight of dish + ash (z) = 35.741 gm Weight of ash = z – x gm

= 35.741 – 35.705= 0.035 gm
Total ash value of boswellic acid = 100(z-x)/y %
= 100(0.035)/2= 1.75%

4) ETERMINATION OF ACID INSOLUBLE ASH VALUE: Calculation

1. Curcumin

Sample weight w_s = 2 gm Crucible weight w = 35.926gm Crucible + ash weight w^f = 35.931 gm Acid insoluble ash = $w^f – w \times 100 / w_s$
= (35.931 – 35.926) × 100 / 2
= 0.25%

2. Boswellic acid : Sample weight w_s = 2 gm Crucible weight w = 36.087 gm Crucible + ash weight w^f = 36.091 gm Acid insoluble ash = $w^f – w \times 100 / w_s$
= (36.091 – 36.087) × 100 / 2
= 0.2%

5) DETERMINATION OF WATER- SOLUBLE ASH VALUE

1. Curcumin

Sample weight w_s = 2 gm Crucible weight w = 30.806 gm Crucible weight + ash weight w^f = 30.882 gm Water soluble ash = $w^f– w \times 100 / w_s$
= (30.882 – 30.806) × 100 / 2
= 3.85 %

2. Boswellic acid

Sample weight w_s = 2 gm Crucible weight w = 35.692 gm Crucible weight + ash weight w^f = 35.764 gm Water soluble ash = $w^f – w \times 100 / w_s$
= (35.764 – 35.692) × 100 / 2 = 3.5 %

6. DETERMINATION OF EXTRACTIVE VALUE/ EXTRACTIVE MATTER DETERMINATION OF ALCOHOL - SOLUBLE EXTRACT

Table No. 1.6: Percentage of extractive value of alcohol-soluble extract.

Sr. no.	Name of powder	Extractive value
1	Boswellic acid	11.4 %
2	Curcumin	11.2 %

Filtration of Boswellic acid alcohol extract

Filtration of curcumin alcohol extract

Drying of extraction

7. DETERMINATION OF WATER- SOLUBLE EXTRACT

Table No. 1.7: Percentage of extractive value of water-soluble extract.

Sr. no.	Name of powder	Extractive value
1	Boswellic acid	10.9 %
2	Curcumin	10.6 %

Filtration of Boswellic acid water extract

Filtration of curcumin water extract

Drying of extraction

- **PHYTOCHEMICAL SCREENING OF ETHANOLIC EXTRACT**

Fig. 1.9: Chemical test of boswellic serrata and curcuma longa.

Sr. no.	Test		Inference Boswellic acid
TESTS FOR CARBOHYDRATES			
1.	**Molisch's test (general test):**	NEGATIVE (-)	Carbohydrate was absent. 
2.	**Benedict's test:**	NEGATIVE (-)	Carbohydrate was absent. 
3.	**Fehling's test**	NEGATIVE (-)	Carbohydrate was absent. 
4.	**Iodine Test:**	NEGATIVE (-)	Carbohydrate was absent. 

TESTS FOR PROTEIN			
1.	**Biuret Test (Genera test):**	NEGATIVE (-)	Protein was absent 
2.	**Millon's Test:**	NEGATIVE (-)	Protein was absent 
TESTS FOR GLYCOSIDE			
1.	**Baljeet's Test:**	NEGATIVE (-)	Glycosides were absent 
2.	**Liebermann's Test (for bufadienolides)**	NEGATIVE (-)	Glycosides were absent 
TESTS FOR ANTHRAQUINONE GLYCOSIDES			
1	**Borntrager's Test**	NEGATIVE (-)	Anthraquinone glycosides absent 
TESTS FOR SAPONIN GLYCOSIDES			
1.	**Foam Test** :	NEGATIVE (-)	Saponin glycoside absent 
TESTS FOR TANNINS AND PHENOLIC COMPOUND			
1	**Lead Acetate Solution:**	NEGATIVE (-)	Phenolic compound was absent 

TESTS FOR ALKALOIDS			
1	**Dragendorff's test:**	NEGATIVE (-)	Alkaloid was absent. 
2	**Mayer's test:**	NEGATIVE (-)	Alkaloid was absent. 
ZESTS FOR AMINO ACIDS			
1	**Ninhydrin test (General test):**	NEGATIVE (-)	Amino acid was Absent 
2	**Test for tyrosine:**	NEGATIVE (-)	Amino acid was absent 
TEST FOR TRITERPENOIDS			
1	**Salkowski reaction:**	POSITIVE (+)	Steroid was present 
2	**Liebermann-** **Burchard reaction:**	POSITIVE (+)	Steroid was present 

TEST FOR FLAVONOIDS:			
1	**Shinoda test:**	NEGATIVE (-).	.Flavonoids was absent. 
2	**Sulphuric acid test:**.	NEGATIVE (-).	Flavonoids were absent. 

8. EVALUATION RESULTS OF HERBAL CREAM

1. Physical parameters

Table No. 1.8: Physical evaluation.

Sr. no.	Tests	Formulations		
		F1	F2	F3
1	Appearance	Smooth Cream	Smooth Cream	Smooth Cream
2	Odor	Characteristic	Characteristic	Characteristic
3	Color	Light Yellow	Yellow	Dark Yellow
4	consistency	Good	Good	Excellent

2. Skin Irritation test

Apply the cream paste sample at the wrist of the human volunteer. Mark the reason with black marker. Observe for at least 24 hours. Note in case any reaction occurred.[12]

Table No. 1.9: Skin irritation test.

Formulation	F1	F2	F3
Time	30min	1 hour	2our
Interpretation	No irritation	No irritation	No irritation

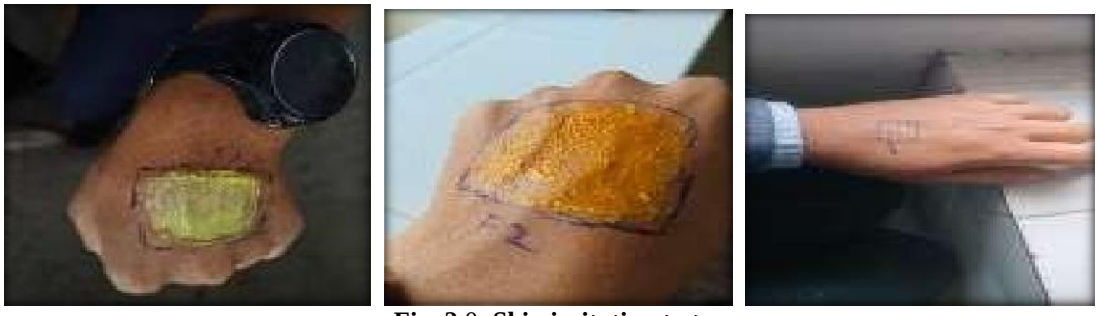


Fig. 2.0: Skin irritation test.

3. Measurement of pH

The pH of cream was determined by using digital pH meter. Take 1 gm of cream and dissolved in 10 ml of distilled water and take apart for two hours. Then the measurement of pH of formulation was done by dipping the glass electrode completely into the solution three times and the average values are reported.[13

Table No. 2.0: pH Evaluation.

Formulation		
F1	**F2**	**F3**
5.8	6.1	6.3

Fig. 2.1: pH Evaluation.

4. Viscosity test

- Transfer an adequate quantity of cream into a clean beaker.
- Maintain the sample temperature at 25 ± 1°C.
- Immerse the selected spindle into the cream without trapping air bubbles.
- Set the viscometer at an appropriate speed (10 rpm).
- Allow the spindle to rotate until a constant reading is obtained.
- Record the viscosity value displayed by the instrument.
- Repeat the measurement three times and calculate the average.[13]

Materials Required

1. Brookfield Viscometer
2. Spindle (Spindle No. 64)
3. Beaker containing cream sample
4. Thermometer

Table No. 2.1: Viscosity test.

Formulation		
F1	**F2**	**F3**
12,500 (cp)	14,000 (cp)	15,500 (cp)

5. Spreadability test

- Place approximately 1 g of cream between two glass slides.[14]
- Apply a known weight 500g on the upper slide for 5 minutes to obtain a uniform film.
- Tie a weight 20g to the upper slide.
- Allow the upper slide to move due to the applied weight.
- Record the time (T) taken by the upper slide to move a fixed distance 7.5 cm.
- Calculate spreadability using the formula**:**

$$S = \frac{M \times L}{T}$$

Table No. 2.2: Spreadability test.

Formulation	Time (s)	Spreadability (S)
F1	12.5	12.0
F2	10.0	15.0
F3	8.0	16.5

6. Stability Test

- Fill the prepared cream formulations (F1, F2, and F3) into airtight containers.
- Store the samples in a stability chamber at:
- 25 ± 2°C / 60 ± 5% RH (Long-term condition)
- 40 ± 2°C / 75 ± 5% RH (Accelerated condition)
- Evaluate the formulations initially (0 month) and after 1, 2, and 3 months.[15]

- **Observation table**

Table No. 2.3: Observation table of stability test.

Parameter	Initial	After 3 Month
Color	Yellow	No change
Odor	Characteristic	No significant change
Homogeneity	Good	Good
pH	5.8 -6.6	Slightly variation
Viscosity	145000	No significant change
Spreadability	Good	Good
Phase separation	Absent	Absent

7. Anti-Microbial Test

- Prepare nutrient agar plates and inoculate them with the test microorganisms.
- Make wells (6–8 mm diameter) in the agar using a sterile cork borer.
- Fill the wells with the anti-psoriatic cream

formulations (F1, F2, and F3).
- Incubate the plates at 37°C for 24 hours.
- Measure the Zone of Inhibition (ZOI) around each well in millimeters (mm).

- **Common Test Organisms**

a. Staphylococcus aureus
b. Escherichia coli
c. Pseudomonas aeruginosa
d. Candida albicans

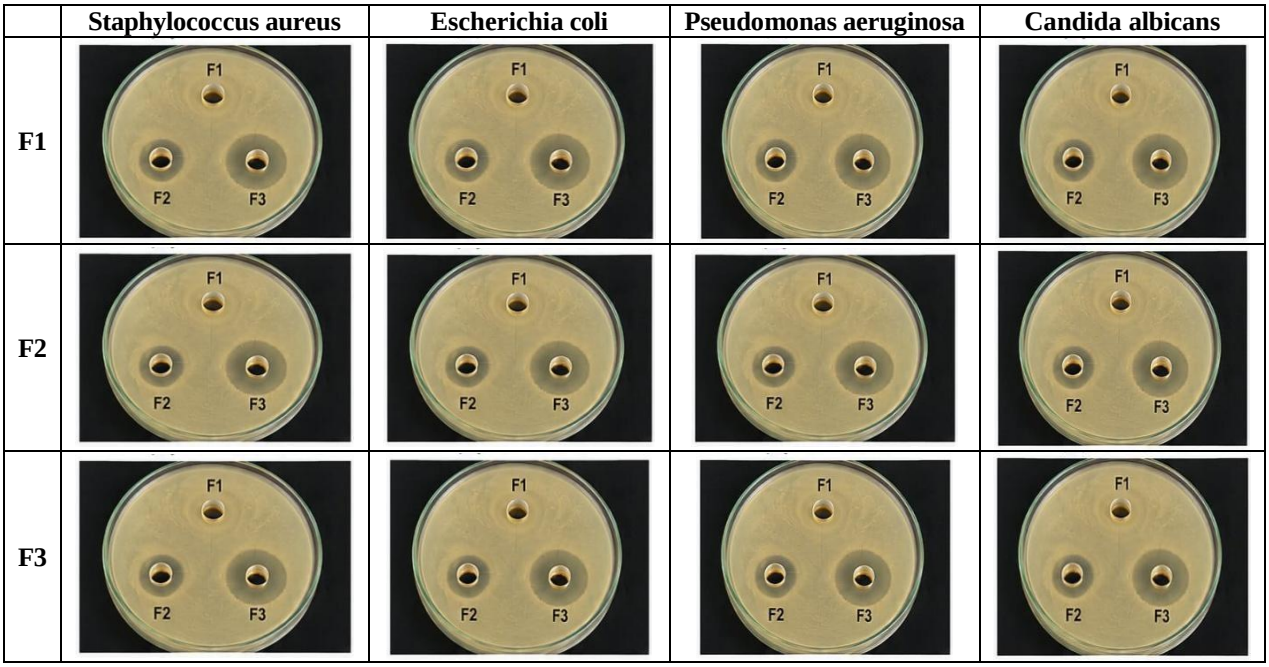


Fig. 2.2: Anti- microbial activity.

Table No. 2.4: Anti-Microbial Test.

	Staphylococcus aureus	Escherichia coli	Pseudomonas aeruginosa	Candida albicans
F1	12 ± 0.5	10 ± 0.4	9 ± 0.3	11 ± 0.4
F2	11 ± 0.4	13 ± 0.5	12 ± 0.4	14 ± 0.3
F3	18 ± 0.3	16 ± 0.4	15 ± 0.5	17 0.4

- The anti-psoriatic cream formulations containing Boswellic Acid, Curcumin, and Aloe Vera gel demonstrated antimicrobial activity against selected bacterial and fungal strains. Among the formulations, F3 showed the highest zone of inhibition and was considered the most effective antimicrobial formulation.[16]

1. Anti-Inflammatory Activity test

- Method: Protein Denaturation Assay (In-vitro)

1. Prepare different concentrations of F1, F2, and F3 cream extracts.
2. Mix with 1% bovine serum albumin (BSA).
3. Incubate at 37°C for 20 minutes.
4. Heat at 70°C for 5 minutes.
5. Cool and measure absorbance at 660 nm using a UV spectrophotometer.
6. Calculate % inhibition of protein denaturation.[17]

Table No. 2.5: Anti-Inflammatory Activity.

FORMULTION	%INHIBITION OF PROTEIN DENATURATION	INFERENCE
F1	62.4 ± 0.5	Low Inhibition
F2	74.8 ± 0.4	Significant inhibition
F3	86.2 ± 0.3	Highest inhibition

- **RESULT OF EVALUATION TABLE**

Table No. 2.6: Result Of Evaluation Table.

Sr. No.	Parameters	F1	F2	F3
1.	**Color**	Light yellow	yellow	Dark yellow
2.	**Skin Irritation test**	No irritation	No irritation	No irritation
3.	**Viscosity test**	12,500 (cp)	14,000 (cp)	15,500 (cp)
4.	**Stability test**	No change	No change	No change

5.	**Spreadability test**	12.0	15.0	16.5
6.	**Measurement of pH**	5.8	6.1	6.3
7.	**Anti-Microbial activity**	10 ± 0.4	13 ± 0.5	16 ± 0.4
8.	**Anti-Inflammatory Activity**	Low Inhibition	Significant inhibition	Highest inhibition

Fig. 2.3: Anti-psoriatic cream.

- **CONCLUSION**

The present study was aimed at the development and evaluation of an anti-psoriatic cream containing Boswellic acid, Curcumin, and Aloe vera gel. These herbal ingredients were selected because of their well-established anti-inflammatory, antimicrobial, wound-healing, antioxidant, and skin-soothing properties, which are beneficial in the management of psoriasis.

This study focused on the development and assessment of an anti-psoriatic cream formulated with Boswellia acid, Curcumin, and Aloe vera gel. These herbal ingredients were selected because of their known anti-inflammatory, antimicrobial, wound-healing, antioxidant, and skin-soothing properties, all of which are useful in managing psoriasis.

Three formulations, designated F1, F2, and F3, were prepared and evaluated for several physicochemical and biological characteristics, including color, pH, viscosity, skin irritation, antimicrobial activity, and anti-inflammatory activity. The results showed that all the formulations were physically stable, uniform, and suitable for topical use.

The pH values ranged from 5.8 to 6.3, which is close to the normal pH of human skin and therefore unlikely to cause irritation. The skin irritation test also confirmed that all formulations were safe, as no irritation was observed. Viscosity increased from 12,500 cP (F1) to 15,500 cP (F3), indicating better consistency and spreadability in the later formulations.

In antimicrobial testing, F3 showed the highest activity, with a zone of inhibition of 16 ± 0.4 mm, compared with 13 ± 0.5 mm for F2 and 10 ± 0.4 mm for F1. Likewise, the anti-inflammatory study showed that F3 had the strongest inhibitory effect, suggesting better potential in reducing inflammation associated with psoriatic lesions.

The superior performance of F3 may be due to the combined action of Boswellia acid, Curcumin, and Aloe vera gel, which together help reduce inflammation, inhibit microbial growth, moisturize the skin, and support healing. These effects are especially valuable in controlling psoriasis symptoms such as dryness, scaling, itching, and irritation.

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