

Herbal Formulation for Crack Heels by Using Calendula Officinalis and Lavendula Officinails

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I. INTRODUCTION

Cracked heels (heel fissures) are a common dermatological condition characterized by dryness, thickened skin, pain, and sometimes bleeding, particularly affecting the plantar surface of the feet. This condition is often caused by excessive dryness, prolonged standing, lack of proper foot care, climatic conditions, and certain systemic disorders. If left untreated, cracked heels may lead to infections and significant discomfort, negatively affecting quality of life. Although several synthetic creams and creams are available, they may cause adverse effects such as skin irritation or allergic reactions with prolonged use. 9



FIG 1: Cracked Heels

Herbal Crack cream A herbal crack cream is a topical formulation prepared using plant extracts such as Calendula officinalis (marigold) and Lavandula spp. (lavender) to treat cracked or damaged skin. Calendula contributes wound-healing, anti-inflammatory, and skin-regenerative properties, while Lavandula provides antimicrobial, antioxidant, and soothing effects. Together, they hydrate, repair, and protect the skin, promoting faster healing of cracks and preventing further damage. 8

Types of Herbal Crack Creams

Urea-Based Creams

- Softens thick skin, deeply moisturizes.
- Good for severe cracked heels.

Herbal / Ayurvedic Creams

- Contains aloe, neem, tea tree, or herbs.
- Soothes and heals mild cracks naturally.

Moisturizing / Barrier Creams¹⁰

- Rich in glycerin, petrolatum, shea butter.



FIG 2: Herbal Crack Cream

Ideal properties of crack cream:

- It should moisturize deeply and heal cracks.²
- It should reduce inflammation and prevent infection.
- It should be safe, herbal, and non-irritating.
- It should be non-greasy and easily absorbable.
- It should protect skin and prevent future cracks.

Advantages of herbs used in crack cream:

- Promotes wound healing by stimulating tissue repair.¹
- Reduces inflammation and soothes irritated skin.
- Provides deep moisturization for dry, cracked areas.
- Has antimicrobial properties, protecting against infections.
- Safe for Antimicrobial, preventing infection in open cracks.
- Supports skin regeneration by promoting fibroblast activity and collagen production.

Disadvantages of herbs used in crack cream:

- Skin sensitivity: Undiluted lavender oil can cause redness, itching, or allergic reactions.
- Potential hormonal effects: High systemic exposure (rare in topical use) may have mild endocrine effects.¹
- Limited efficacy alone: Less effective in severe cracks if not combined with moisturizers or keratolytic agents.
- Fragrance issues: Strong smell may be irritating to some users.

Why use these herbs for cracked heels?

- Calendula helps promote wound healing, reduce inflammation, and protect skin from irritation.¹
- Lavender accelerate wound healing, increase collagen production, and reduce inflammation, making it useful in topical skin formulations.²
- sensitive skin and chemical-free.
- Anti-inflammatory and analgesic, reducing pain and irritation.

II. MATERIALS AND EXPERIMENTAL WORK

2.1 LIST OF DRUGS AND EXCIPIENTS

Table No. 1 List of ingredients and their sources

SR. NO.	CHEMICALS	SOURCES
1	Calendula officinails	MIBP COLLEGE

	extract	GARDEN
2	Lavendula Officinails extract	MIBP COLLEGE GARDEN
3	Lavender oil	MARICO LTD MUMBAI
4	Cocoa butter	RESEARCH-LAB FINE CHEM INDUSTRIES, MUMBAI
5	Coconut oil	MARICO LTD MUMBAI
6	Bess wax	BURGOYNE BURBIDGES & CO MUMBAI
7	Glycerin	RESEARCH-LAB FINE CHEM INDUSTRIES, MUMBAI
8	Urea	LOBA CHEMIE PVT LIT
9	Methyl Paraben	RESEARCH-LAB FINE CHEM INDUSTRIES, MUMBAI
10	Vitamin E	PROCTER AND GAMBLE HEALTH LTD, GOA
11	Purified water	MIBP COLLEGE

Table No. 2 List of intruments

SR NO.	INSTRUMENT	MAUFACTURER
1	Soxhlet apparatus	LABLINE
2	pH meter	SYSTRONICS GLOBE INSTRUMENT
3	Brookfield Viscometer	BROOKFIELD ENGINEERING LABORATORIES
4	Digital Balance	KERRO P3
5	Digital Autoclave	ASI-254
6	B.O.D Incubator	HMG-GONDIA
7	Mixer Grinder	JYOTI
8	Hot air oven	METALAB SCIENTIFIC

		INDUSTRIES
9	UV-Spectrophotometer	SHIMADZU MODEL NO-1700
10	Heating mantle	BIOTECHNICS INDIA
11	Rectangular water bath	LABLINE

2.2 PREPARATION OF HERBAL CRACK CREAM

STEP 1: Preparation of Oil Phase

- Take cocoa butter, coconut oil and beeswax in a clean beaker.
- Heat the mixture on a water bath at 70–75°C until all ingredients melt completely.
- Add vitamin E and lavender oil to the melted mixture and stir properly to obtain a uniform oil phase.

STEP 2: Preparation of Aqueous Phase

- In another beaker take purified water and heat it to about 70°C.
- Add glycerin and urea to the warm water and stir until completely dissolved.
- Add methyl paraben as a preservative and mix well.

STEP 3: Incorporation of Herbal Extracts

- Take Calendula officinalis extract powder and Lavandula officinalis extract powder.
- Dissolve or disperse the extracts in a small quantity of the warm aqueous phase to avoid lump formation.
- Mix thoroughly until a smooth dispersion is obtained.

STEP 4: Emulsification

- Maintain both oil phase and aqueous phase at the same temperature (≈70°C).
- Slowly add the aqueous phase into the oil phase with continuous stirring.
- Stir the mixture using a mechanical stirrer or glass rod until a uniform emulsion forms.

STEP 5: Cooling and Homogenization

- Continue stirring the emulsion while allowing it to cool gradually to room temperature.
- During cooling, the cream becomes thicker and smoother.
- Homogenize properly to obtain a stable and uniform herbal crack cream.

STEP 6: Packaging¹⁵

- Transfer the prepared cream into clean, dry, airtight containers.
- Label and store at room temperature away from direct sunlight.

2.3 FORMULA

Table No. 3 Formulation of cream

INGREDIENTS	F1	F2	F3
Calendula officinalis extract	2g	2.5g	3g
Lavandula Officinalis extract	0.8g	1g	1.2g
Lavender oil	0.2ml	0.25ml	0.3ml
Cocoa butter	3g	4g	5g
Coconut oil	5ml	6ml	7ml
Bess wax	4g	5g	6g
Glycerin	5ml	4ml	3ml
Urea	1.5g	2.5g	4g
Methyl Paraben	0.07g	0.075g	0.08g
Vitamin E	0.2ml	0.25ml	0.3ml
Purified water	q.s to 30g	q.s to 30g	q.s to 30g
Total	30 g		

III. PREFORMULATION STUDY

1. CALENDULA OFFICINAILS (POT MARIGOLD)

EXTRACTION PROCEDURE: -

25gm of calendula officinails flower powder was placed into the thimble and placed in the Soxhlet chamber. 200 ml of selected solvent (ethanol) were placed in a round bottom flask and assembled for Soxhlet extractor then the distillation process was begun. After completed the extraction process, the solvent and extractor were placed on water bath to evaporate the solvent.



FIG 5: Extraction of calendula officinails

ORGANOLEPTIC EVALUATION: -

- Colour: - yellowish-Brown colour
- Odour: - Characteristic or woody
- Taste: - Slightly bitter
- Texture: - slightly gritty
- Appearance: - powder

2. LAVANDULA OFFICINALIS

EXTRACTION PROCEDURE: -

20gm of Lavandula Officinalis 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. [10]

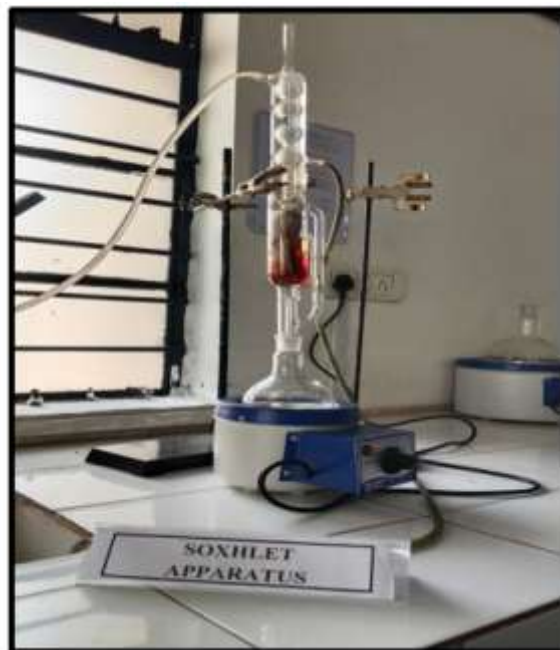


FIG 6: Extraction of lavendula officinails

ORGANOLEPTIC EVALUATION: -

- Colour: - purple in colour
- Odour: - Characteristic odour
- Taste: -Slightly bitter
- Texture: - Delicate and soft
- Appearance: -powder

PHYTOCHEMICAL PARAMETERS

- Foreign matter test: -Procedure: -17
 - 1) Take weighed quantity of crude drug (500 gm root stem/ dark, 250gm leaves, flowers, seeds fruits, 50gm cut plant material).
 - 2) Spread the sample on a white tile or a glass plate uniformly without overlapping
 - 3) Inspect the sample with naked eyes or by means of a lens (5× or above).
 - 4) Separate the foreign organic matter (mentioned above) manually.
 - 5) After complete separation, weigh the matter and determine % w/w present in the sample.

- Determination of loss of drying (LOD): - Procedure: -17

- 1) Weigh about 2g of *Calendula officinalis* powdered drug into weighed flat and thin porcelain dish.
- 2) Dry in the oven at 100°C until two consecutive weighing do not differ by more than 0.5mg.
- 3) Cool in desiccator and weigh. The loss in weight is usually recorded as moisture.

- Determination of ash value of crude drug: - Procedure: -17

- 1) Weigh and ignite flat, thin, porcelain dish.
- 2) Weigh about 2g of powdered drug into the crucible.
- 3) Add crucible in muffler for ignition and convert powder into ash.
- 4) Cool in desiccator
- 5) Weigh the ash and calculate the percentage of total ash.

- Determination of acid insoluble ash value: Procedure: -17

Procedure as per the steps mentioned in the procedure for determination of total ash value of the drug. –Further

- 1) Using 25 ml of dilute hydrochloric acid, wash the ash from the dish used for total ash into a 100 ml beaker.
- 2) Place ash into muffler until it burns again then filter through an ashless filter paper, wash the residue twice with hot water.
- 3) Put filter paper and crucible and residue together into crucible; heat gently until vapours cease to be evolved and then more strongly until all carbon has been removed.
- 4) Cool in desiccator.
- 5) Weigh the residue and calculate acid insoluble ash of the crude drug with reference to the air-dried sample of the crude drug.

- Determination of water-soluble ash: - Procedure: - 17

This is determined in the similar way to acid insoluble ash, using 25 ml of water, in place of dilute hydrochloric acid.

- Determination of sulphated ash: - Procedure: -17

Take 1-2 g of substance in an accurately weighed crucible, ignite gently at first until the substance is thoroughly charred. Cool, moisten the residue with 1 ml of sulphuric acid, heat gently until white fumes are no longer evolved and ignite at 800°C+ 25°C until black particles have disappeared. Allow the crucible to cool, add a few drops of sulphuric acid and heat. Ignite as before, allow to cool and weigh. Repeat the operation until two successive weighing do not differ by more than 0.5 mg.

- Determination of alcohol soluble extractives (cold maceration): - Procedure: -17

1. weigh about 4g of the coarsely powdered drug in a weighing bottle and transfer it to a dry 250 ml conical flask.
2. Fill a 100 ml graduated flask to the delivery mark with the solvent (90% alcohol). Wash out the weighing bottle and pour the washings, together with the remainder of the solvent into the conical flask.
3. Cork the flask and set aside for 24 hours, shaking frequently. (Maceration).
4. Filter into a 50 ml cylinder. When sufficient filtrate has collected, transfer 25 ml. of the filtrate to a weighed, thin porcelain dish, as used for the ash values determinations.
5. Evaporate to dryness on a water-bath and complete the drying in an oven at 105°C.
6. Cool in a desiccator for 30minutes and weight immediately.
7. Calculate the percentage w/ w of extractive with reference to the air-dried drug.

- Determination of water-soluble extractives (cold maceration): Procedure: -17

1. Step are similar to those mentioned in the previous experiment.
2. Use chloroform water instead of alcohol (Chloroform acts as a preservatives)

IV. RESULT & DISCUSSION

1) FOREIGN MATTER TEST:

Table No. 4: - Foreign matter

Sr. no.	Name of Ingredients	Observation
1	Calendula officinails	No foreign matters are found
2	Lavendula officinails	No foreign matters are found



FIG 7: Foreign matter test

Table No. 5 Percentage yield

Sr. no.	Name of powder extracted	Percentage yield
1	Calendula Officinails powder	Actual weight = 1.969 gm Theoretical yield = 2.5 gm Percentage yield = 7.88%
2	Lavendula Officinails powder	Actual weight = 1.479 gm Theoretical yield = 2.5 gm Percentage yield = 5.916%

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

Calculation: - 1. Calendula Officinails: - Weight of sample = 2 gm

Weight of porcelain dish + sample before drying = 34.910 gm

Weight of porcelain dish + sample after 1st drying = 34.740 gm

Weight of porcelain dish + sample after 2nd drying = 34.734 gm

Difference between LOD = sample after 1st drying – sample after 2nd drying = 34.740 - 34.734 = 0.006 gm



2. Lavendula Officinail: - Weight of sample = 2 gm

Weight of porcelain dish + sample before drying = 33.568 gm

Weight of porcelain dish + sample after 1st drying = 33.456 gm

Weight of porcelain dish + sample after 2nd drying = 33.448 gm

Difference between LOD = sample after 1st drying – sample after 2nd drying = 33.456 - 33.448 = 0.008 gm



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

1. Calendula officinails

Weight of empty dish (x) = 35.896 gm

Weight of dry powder taken (y) = 2 gm

Weight of empty dish + dry powder = 37.532 gm

Weight of dish + ash (z) = 36.050 gm

Weight of ash = z – x gm
= 36.050 - 35.896
= 0.154 gm

Total ash value of Calendula officinails = 100(z-x)/y
% = 100(0.154)/2
= 7.7%



2). Lavendula Officinails

Weight of empty dish (x) = 30.797 gm Weight of dry powder taken (y) = 2 gm
Weight of empty dish + dry powder = 32.557 gm
Weight of dish + ash (z) = 30.917gm
Weight of ash = z – x gm
= 30.917-30,797
= 0.12 gm

Total ash value of Lavendula Officinails = 100(z-x)/y
% = 100(0.12)/2= 6%



1) DETERMINATION OF ACID INSOLUBLE ASH VALUE: Calculation:

2. Calendula officinails

Sample weight w_s = 2 gm
Crucible weight w = 35.896 gm Crucible + ash weight w^f = 35.921 gm Acid insoluble ash = $w^f - w \times 100 / w_s$
= (35.921-35.896) $\times 100 / 2$
= 1.25%

Sr. No	TEST	OBSERVATION	INFERENCE	
			Calendula officinails	Lavendula officinails
TEST FOR FLAVONOIDS: -				



3. Lavendula officinails

Sample weight w_s = 2 gm
Crucible weight w = 30.797gm Crucible + ash weight w^f = 30.818 gm Acid insoluble ash = $w^f - w \times 100 / w_s$
= (30.818-30.797) $\times 100 / 2$
= 1.05%



PHYTOCHEMICAL SCREENING OF ETHANOLIC EXTRACT



1	Shinoda test:- To dry powder of extract, add 5ml 95% ethanol, few drops conc. HCL and 0.5g magnesium turnings.	Orange, pink, red to purple color appears.	Flavonoids were present	Flavonoids were present
				

TEST FOR STEROIDS

1	Salkowski reaction:- To 2ml of extract, add 2ml chloroform and add 2ml con. H ₂ SO ₄ . Shake well.	First red then blue and finally green color appears	Steroid was present	Steroid was present
				

TEST FOR PROTEINS

1	Millon's Test:- Mix 3ml test solution with 5ml Millon's reagent and heat	White precipitate; warm precipitate turns brick red or dissolves into solution	 Proteins was present	 Proteins was absent
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TEST FOR VOLATILE OIL

1	Sudan red III: Mix 2ml extract with 3-4 drops of sudan red 3	Red color appears	Volatile oil present	Volatile oil present
				

TEST FOR CARTENOIDS			
1) Extrat 2ml+chloroform 2ml +1% Antimony trichloride solution/Iodine solution	Dark Blue color appear	Cartenoids was present 	Cartenoids was present 
TEST FOR PHENOLS			
1) 2 ml of extract and aad FeCl solution drops	Green blue color appear	Phenols was absent 	Phenols was present 

V. CONCLUSION

The present study successfully formulated and evaluated a herbal crack heel cream using natural ingredients like Calendula and Lavender. The prepared formulations (F1, F2, and F3) showed acceptable physical properties such as good color, characteristic odor, and smooth consistency.

The pH of all formulations was found to be near neutral, indicating that the cream is safe and suitable for skin application without causing irritation. Spreadability results showed that the cream can be

easily applied on the skin, ensuring proper coverage. Washability was also satisfactory, making it convenient for regular use.

Skin irritation tests confirmed that the formulations were non-irritant and safe for human use. Viscosity measurements indicated that the cream has appropriate thickness, which helps in easy application and retention on the skin.

The antimicrobial study demonstrated that the herbal cream possesses moderate activity against microorganisms, although slightly lower than the

standard drug. This indicates that the presence of herbal ingredients contributes to protection against infections.

Overall, the formulated herbal crack cream is effective, safe, and stable. It provides moisturizing, healing, and protective effects for cracked heels. Hence, it can be considered a good natural alternative to synthetic creams for the treatment of cracked heels.