



FORMULATION AND EVALUATION OF HERBAL FOOT CRACK CREAM

¹MOHINI SURESH SUKHADHAN, ²PROF. BHAGYASHREE GOPALRAO DHOTRE, ³ROSHANI GAUTAM SHINDE, ⁴AASHA RENAJI KARKE, ⁵KOMAL SADANAND SHIRSATH.
RAJESH BHAIYYA TOPE COLLEGE OF PHARMACY NIPANI- BHALGAON CHHATRAPATI
SAMBHAJI NAGAR.

Abstract: The objective of this research is to develop and assess a herbal cream designed for the treatment of cracked heels, utilizing the synergistic effects of almond oil, glycerin, turmeric, and *Nyctanthus arbortristis*. Cracked heels are a prevalent dermatological issue characterized by painful fissures in the heel skin, often resulting from dryness and sustained pressure. This study aims to create a safe and entirely natural solution to relieve this condition. The natural components selected for the formulation of the herbal cream are well-known for their skin rejuvenating properties. The extract of *Nyctanthus arbortristis* was included for its potential anti-inflammatory effects, while almond oil was selected for its deep moisturizing and emollient characteristics. Glycerin was added as a humectant, contributing to the cream's moisturizing and emollient qualities.

Keywords : Herbal Heel Crack Cream, Foot cream, healing cream, skin moisture meter, dryskin treatment, anti inflammatory ,antimicrobial, wound recovery.

1.Introduction : The feet act as the body's foundation. It is essential to prioritize the health of our feet and nails just as we do for any other body part. During physical activities, sports, and various daily tasks, force is transmitted through the hands and feet, with the feet enduring the majority of this pressure.

THE FOOT :

The human foot consists of 26 small bones intricately connected by a well-structured network of ligaments, muscles, tendons, and cartilage. Elastic tendons link the muscles to specific regions of the foot, enabling movement through muscle contraction. More than a hundred ligaments work to maintain the integrity of these structures, with the long plantar ligament being the most robust, serving as a trampoline to absorb shock and support body weight.[1]The foot's architecture includes two main arches that function as springs or shock absorbers, each made up of a series of bones, strong ligaments, and cartilage. The feet are designed to serve two fundamental purposes: providing support and facilitating mobility. The heel serves as a stable foundation for standing, while the toes and forefoot are primarily engaged in walking. The strength and flexibility of our feet affect our walking patterns, which in turn influence our posture and weight distribution. Neglecting foot care can result in stiffness or weakness, potentially leading to problems such as back pain, leg cramps, and fatigue.[2]

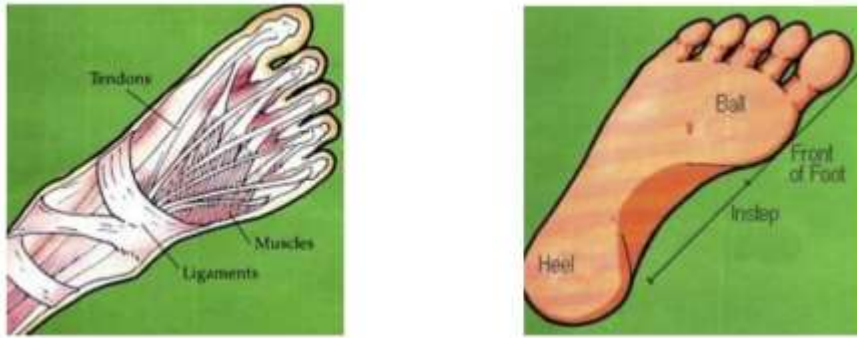


Figure 1. THE FOOT

Cracked Heels:

Cracked heels are indicative of inadequate foot care rather than simply being caused by excessive exposure or lack of moisture. Known medically as heel fissures, these linear wounds primarily impact the epidermis but may occasionally penetrate the dermis, leading to discomfort. Excessive pressure on the foot pads causes the feet to expand sideways, resulting in cracks when the surrounding skin is dry. The presence of dry, cracked heels may also indicate deficiencies in zinc and omega-3 fatty acids. While cracks can appear on any part of the body, they are most frequently located at the heel rim and between the toes, which are areas that experience significant use. Xerosis, or dry skin, is a common contributor to cracked heels, along with thick or callused skin around the heel rim. Many foot problems arise from neglecting foot care, making conditions such as cracked heels and corns largely preventable. Although cracked heels are typically not dangerous, deep fissures can become painful and bleed, potentially leading to infections, particularly in individuals with chronic conditions like diabetes or those with weakened immune systems due to age or illness, which can impede healing. Cracked heels are especially prevalent among seniors or individuals who spend extended periods on their feet, as the pressure on the foot pads increases. Furthermore, sebum production decreases with age, resulting in dry and cracked heels. Seniors often suffer from excessively dry, peeling skin and recurrent dry skin issues on the heels, which may affect one or both heels.



Figure 2. Foot crack heels

Drug profile :

Name of drug	Botanical classification	Chemical constituents	Uses
1.Nyctanthus arbortristis leaves 	Synonyms: Bruschia macrocarpa Bertol.Nyctanthes dentata BlumeNyctanthes tristis Salisb., nom. Superfl. Parilium arbor-tristis (L.) Gaertn. Scabrita scabra L. Biological source: Nyctanthus arbortristis leaves are derived from the nyctanthus Arbortristis plant (parijat), the plant is native to South Asia and is widely Distributed in india and other parts of Southeast Asia. Family: Oleaceae Genus: Nyctanthes Species: Arbor-tristis	The leaves of Nyctanthes arbor-tristis are rich in various chemical compounds, such as flavanol glycosides, D-mannitol, β-sitosterol, astragalin, nicotiflorin, oleanolic acid, nyctanthic acid, ascorbic acid, and tannic acid. Furthermore, they also contain resinous materials, amorphous glycosides, amorphous resins, small quantities of volatile oils, carotene, friedelin, lupeol, mannitol, glucose, fructose, iridoid glycosides, and benzoic acid.	Medicinal uses : Fever: Leaf juice is used to reduce fever, especially in cases of malaria, dengue, and chikungunya. constipation in children.
2.. Turmeric 	Synonyms: Rhizoma curcumae. Biological source: Turmeric's biological source is the dried rhizome of the Plant Curcuma longa, also known as Curcuma domestica Valetton. This rhizome Is a type of underground stem that acts as the root for the turmeric plant . The Rhizome comes from the plant Curcuma longa. Drying: The rhizomes are dried Family: Zingiberaceae (Ginger family) Genus: Curcuma Species: Curcuma longa (Turmeric)	The biological source of turmeric is the desiccated rhizome of the Curcuma longa plant, commonly referred to as Curcuma domestica Valetton. This rhizome serves as an underground stem that functions as the root of the turmeric plant. The rhizome is sourced from Curcuma longa. Prior to being processed into the yellow powder recognized as turmeric, the rhizomes undergo a drying process. The plant is indigenous to the tropical regions of South Asia.	Medicinal uses : •Anti-inflammatory Properties: Curcumin, the active compound in turmeric, is known for its strong anti-Inflammatory effects, potentially aiding in conditions like arthritis and inflammatory bowel disease. •Antioxidant Effects: Turmeric's antioxidants can help combat free radicals, which may contribute to aging and disease.
3. Almond oil	Synonyms: Biological source: Almond oil is derived from the seeds of	Almond oil is predominantly made up of oleic acid, a type of monounsaturated fatty	• Skin Care: Hydration: The fatty acids in almond oil effectively retain moisture, ensuring the

	the almond tree, scientifically referred to as <i>Prunus dulcis</i>. It is extracted from the seeds of both the sweet almond (var. <i>Dulcis</i>) and bitter almond (var. <i>Amara</i>) varieties. Almond trees are originally from the Middle East and are now cultivated in numerous regions around the world. Family: Rosaceae (Rose family) Genus: <i>Prunus</i> Species: <i>Prunus amygdalus</i> (Almond)	acid, along with other fatty acids such as linoleic, palmitic, and stearic acids. Additionally, it contains tocopherols, especially α-tocopherol, which is a variant of vitamin E.	skin remains soft and elastic. • Anti-aging Benefits: The presence of Vitamin E and various antioxidants helps neutralize free radicals, thereby minimizing the appearance of fine lines and wrinkles. • Relief from Inflammation: It calms irritated skin and alleviates conditions such as eczema and psoriasis, leading to a reduction in redness.
4. Glycerine: 	Chemical Name: Glycerol • IUPAC Name: Propane-1,2,3-triol • Molecular Formula: $C_3H_8O_3$ • Molar Mass: 92.09 g/mole Biological source: Glycerine, commonly referred to as glycerol, is obtained from natural fats and oils present in both plant and animal sources.	Glycerol, commonly referred to as glycerin, is a transparent, odorless, viscous, and colorless liquid that possesses a sweet flavor. It is a non-toxic, non-hazardous, and biodegradable substance present in all natural fats and oils. Glycerol serves multiple purposes across the food, pharmaceutical, and personal care sectors. In terms of its chemical characteristics, glycerol is hygroscopic.	Moisture Retention: Glycerine is a powerful humectant, meaning it attracts and retains moisture from the environment. When used in a hair growth spray, it helps • Scalp Health Support: A well-hydrated scalp is less prone to issues like dryness, flaking, or Irritation—all of which can inhibit hair growth. Glycerine helps maintain the scalp's moisture barrier, promoting overall scalp health.

Formulation table:

Sr.No	Ingredients	Function	Quantity(50g)
1	Nyctanthus arbortristis extract	Healing agent	3 g
2	Turmeric powder	Antimicrobial	1 g
3	Almond oil	Moisturizer	8 ml
4	Glycerine	Humectant	4 ml
5	Potassium hydroxide	pH adjust	1 g
6	Methyl paraben	Preservatives	1 g
7	Stearic acid	Thickener,emulsifier	10 g
8	Lanolin	Skin protecting, emollient	2 g
9	Water	Vehicle	20 ml

- Extraction Method:**

- Nyctanthus arbortristis Leaves Extraction:

- ☐ Collect fresh Nyctanthus arbortristis leaves, wash them thoroughly
- ☐ Dry them in a shaded area to preserve their bioactive properties.
- ☐ Once dried, grind the leaves into a fine powder to increase the surface Area for Extraction.
- ☐ Mx the powder leaves with ethanol in a specific ratio (e, g, 1:10 w/v).
- ☐ The mixture is then subjected to process (Maceration).
- ☐ After Extraction, filter the mixture to separate the liquid extract from The solid residue.



Figure .1. Nyctanthus arbortristis leaves



Figure no 2. Nyctanthus arbortristis leaves powder



Figure no 3. Dispersed in Ethanol



Figure no 4. Filtration Process



Figure no 5. Extraction Of Nyctanthus arbortristis leaves

• Method of preparation :

1. Prepare the Extracts

Dry and crush Nyctanthus arbortristis leaves separately. Macerate In ethanol 75%) for 48–72 hours using a 1:10 w/v ratio. Filter and Concentrate using a water bath at 40–50°C. Measure approx. 10ml of each Concentrated extract for use.

2. Mix the Ingredients :

1. Weight all the required ingredients for herbal cream properly and keep Them Separately.
2. Take stearic acid, lanolin, in beaker and melt at 60°C.
3. Take another beaker and add glycerine, potassium hydroxide, and water .Heat upto 60°
4. Add preparation of first beaker into the second beaker drop by drop. With continuously Stirring.
5. Add the herbal extract to the mixture and stir continuously.
6. After cooling add methyl paraben, mix and stirr continuously
7. Add turmeric powder mixed with add fragrance almond oil mix Thoroughly to obtain Uniform product.
8. Stored it in closed container in cool place.

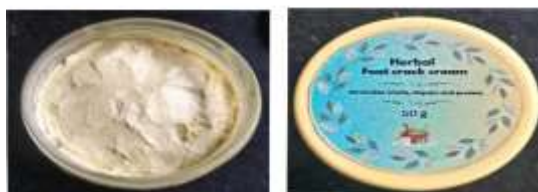


Figure no.6. Herbal foot crack cream

- **Experimental work:**
- Physicochemical Test :
- Alkaloids :

1. Dragendorff's test: To small amount of sample few drops of dragendorff's Reagent added and observe for the Prominent yellow precipitates.
2. Mayer's Test: To small amount of sample few drops of 1%HCl added Followed by addition of few drops of Mayer's Reagent (potassium Mercuric chloride solution). Observe for the formation of cream white Precipitation or else turbid Extract is observed.
3. Wagner's test: To small amount of sample Wagner's reagent (iodine in Potassium iodide) was added and observed for The formation of reddish Brown precipitates
4. Hager's test: To small amount of sample small amount of saturated Aq. Solution of picric acid was added and observe For the Yellow colour

• Glycoside :

1. To small volume of sample extract few drops of conc. HCl added and was Boiled for 4-5 hours. To this 1 ml of distilled Water added followed by the Addition of 10% NaOH. Observe for the formation of yellow colour.

• Saponins :

1. Foam test: To small volume of sample 5 ml of distilled water added and Mixed vigorously for 15 sec. And observe for Persistent froth appearance.

• Tannins :

1. Ferric chloride test: To small amount of sample few drops of 5% ferric Chloride solution was added and see for blue- Black or blue-green colour Formation.

• Carbohydrates :

1. Molisch's test: To small amount of sample few drops of alpha naphthol Solution was added followed by the addition of Conc. HCl or H₂SO₄ Slowly. Observe the purple or violet ring.

• Proteins or Amino acids :

1. Biuret test: To small amount of sample, 4% NaOH added followed by the Addition of 1% CuSO₄ and observe the Violet or pink coloration.

• Quinone Test :

1. Small amounts of sample treated with conc. HCl and observe for the Yellow colored precipitates or yellow coloration.



Figure no.7. Physicochemical test of Nyctanthus arbortristis extract

• Evaluation parameters:

1. Physical appearance: The physical appearance of the formulation was Checked visually.

• Colour: The colour of the formulations was checked out yellowish colour.

• Consistency: The consistency was checked by applying the cream on to The skin.

• Greasiness: The greasiness was assessed by the application on to the skin.

• Odour: The odour of the cream was checked by mixing a little amount of Cream in water and by Taking smell.

2. Determination of pH : The pH values of 1% aqueous solutions of the optimize Cream was measured At 25°C using a pH meter.

3. Spreadability: The Spreadability of the cream formulations was determined By measuring the Spreading diameter of 1 g of cream between two horizontal Plates (20 cm x 20 cm) after one min.

4. Irritancy test: Mark an area (1sq.cm) on the foot dorsal surface. The cream Was applied to the Specified area and time was noted, Irritancy, erythema, Oedema, was checked if any for regular Intervals up to 24 hrs and reported.

5. Viscosity Test: Viscosity of formulated creams can be determined by using Brookfield viscometer.

6. Homogeneity : The formulation was tested for the homogeneity by the visual .Appearance and by Touch.

7. Phase Separation: The prepared cream was transferred in a suitable wide container. Then Stored the cream for visualization after 24 hours, We Will visualise the oil phase and aqueous phase Separation

8. Irritancy: The cream was applied on the skin and leave for few minutes and The effect was studied.

9. Washability: Formulation applied on the skin and then case extends of washing With water be easily Washed and should not remain in our hands after washing.

10. Microbiological study: The formulated crack creams inoculated On the Petriplates of agar media by using the streak Plate method and an impact was Prepared by Omitting the crack cream. The petriplates were Placed into the Incubator and are incubated at 37°C For 24h. After the time period plates were Taken out And check microbial growth by comparing it with the control.



Figure no.8 S.aures zone of inhibition

Result : A herbal crack cream can be formulated using Almond oil, Turmeric, Glycerine, and lanolin. This cream is effective for treating Cracked heels. It can be inferred that herbal creams, which are free from Side effects and possess anti-inflammatory properties, can serve as a Protective barrier for the skin. Improvement in skin moisture levels. Increased elasticity: Better skin flexibility and minimized cracking. Alleviated discomfort: Reduced pain and itching linked to dry, cracked Feet. Excellent application and removal: Simple to apply and wash off. Optimal pH and viscosity: Appropriately aligned with the skin's natural pH and a pleasant texture.

Properties	Observation
Colour	Yellowish
Odour	Characteristics
State	Semisolid
Texture	Smooth
pH	7
Homogeneity	Excellent
Appearance	Uniform
After feel	Emollient
Type of smear	Greasy
Removability	Easily removable
Irritancy test	Non irritant
Phase separation	No change
Thermal stability	Stable

Conclusion : The development and assessment of an herbal cream for Treating foot cracks have been finalized. This cream is specifically Formulated to combat dryness, cracking, and discomfort in the feet while Reducing the likelihood of skin irritation. In summary, the analysis and Extraction of the heel crack cream utilizing Nyctanthus arbortristis leaves Have yielded encouraging results. The research findings suggest that a heel Crack cream made with Nyctanthus arbortristis extract could significantly Enhance foot care products by addressing issues such as dryness, itchiness, and irritation associated with heel cracks. Additionally, the cream's Potential antimicrobial and anti-inflammatory properties, derived from Nyctanthus arbortristis, may provide further benefits in preventing Infections and promoting wound healing. Future studies could build upon These findings by evaluating the cream's effectiveness in clinical settings, Optimizing the formulation for better performance, and investigating the Potential applications of Nyctanthus arbortristis in skincare products. Overall, this research underscores the importance of natural ingredients Like Nyctanthus arbortristis extract in developing effective and gentle Skincare solutions.

Reference :

1. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2792546> (16/02/16).
2. <http://www.cosmeticsandtoiletries.com/formulating/category/skincare/>
3. Wilkinson J.B, Hoore R.J; Harrys Cosmeticology; Foot care Products, Seventh edition; 190-205
4. <http://homeremediesforlife.com/cracked-heels/> (05/02/16)
5. <http://www.myhealthtips.in/2013/09/how-to-heal-cracked-feet-Quickly.html> (26/01/16)
6. Patil, V.V., Thorat, Y.S., Kote, N.S. And Hosmani, A.H., 2020. Formulation And Evaluation of Crack Cream from Plant. Extracts. International Journal Of Current Pharmaceutical Research, pp.130-132.
7. Prasad Rajendra Wangade, Mr. Ravikumar Raosaheb Patil, Formulation And Evaluation of Herbal Crack Cream, International Journal of Research Publication and Reviews, Vol 6, Issue 3, pp 7975-7985 March 2025
8. American Academy of Dermatology (AAD): The AAD often publishes Articles and guides on common skin conditions, including dry skin And Cracked heels.
9. 2. Kumar, P., & Sharma, R. (2017) Herbal cosmetics and its emerging Trends in the cosmetic industry. Journal of Medicinal Plants Studies, 5(4), 256-261.3. N. H. D. Subashini, K. P. Rajagopal, & M. N. R. R. Rao. (2016). Aloe vera and its therapeutic effects in dermatology: A review. International Journal of Pharmacognosy and Phytochemical Research.
10. M. R. Khokhar, F. B. Ramachandran, & N. T. Joseph. (2020). Aloe vera And its pharmacological properties in the treatment of skin disorders Journal of Traditional and Complementary Medicine.
11. Nayak, S., & Purohit, P. (2018) Turmeric: The Golden Herb and Its Skin Benefits. International Journal of Pharmaceutical Science Invention, 7(2), 32-38.

- 12.6. S. K. R. P. S. Kumar, V. P. Sundaram, & T. N. R. K. Kumar. (2015). Anti-Inflammatory and analgesic effects of camphor and its derivatives: A Review. *Journal of Ethnopharmacology*.
- 13.. L. M. L. B. Faergemann, H. R. N. G. Gustafson, & E. F. M. Westberg. (2017). Efficacy of moisturizing agents in the treatment of eczema and Other dermatologic conditions. *Journal of Clinical Dermatology*.
- 14.. N. V. Patil, M. S. A. S. Rao, & S. V. Jadhav. (2019). Rose petals as a Natural remedy for menstrual discomfort and associated symptoms. *Asian Journal of Traditional Medicine*.
- 15.S. G. D. Gupta, P. V. M. Chattopadhyay, & K. P. M. Ghosh. (2014). Turmeric extraction methods for enhanced curcumin yield: A review. *International Journal of Pharmaceutics*.
16. M. M. B. Meena, R. M. K. R. Rani, & K. S. A. Venkat. (2018). Extraction And characterization of Aloe vera gel: A comprehensive review on The Different techniques. *Journal of Applied Pharmaceutical Science*.
- 17.M. S. Kumar, R. R. Gupta, & M. B. Tiwari. (2019). Evaluation of herbal-Based creams: Sensory analysis of aroma and texture. *Journal of Cosmetic Dermatology*.
18. Kumar, V., & Verma, P. (2015) Mustard oil as a skin care ingredient in Cosmetic formulations. *International Journal of Cosmetic Science*, 37(3), 259-267.
19. Sahu, R., & Chattopadhyay, D. (2017) Role of coconut oil in skin care and Its formulation in cosmetics. *Journal of Clinical and Aesthetic Dermatology*, 10(7), 12-19.
- 20.Bhat, K., & Suri, S. (2019) Evaluation of herbal formulations in the Treatment of cracked skin: A clinical study. *International Journal of Research in Pharmaceutical Sciences*, 10(2), 485-490.
- 21.Tiwari, A., & Sharma, P. (2018) Camphor and its role in skin care Formulations: A scientific review. *Journal of Herbal Medicine*, 6(3), 101-105.
22. Nightingale, R., & Black, S. (2014) Formulation of dermatological creams And evaluation of their stability and efficacy. *Pharmaceutical Development And Technology*, 19(3), 220-228.
23. Shah, P., & Pandey, D. (2020) Formulation, development, and evaluation Of herbal skin care products. *International Journal of Pharmaceutical Sciences Review and Research*, 62(1), 27-34.
- 24.Keisuke H, Satoshi T, Yasunobu O. Preparation of a Liposomes and Niosomes of New Topical Formulation. *J. Geo phys. Res.* 2011;118:1-7.
- 25.Madhusudan RY, Jithan YA. Pharmaceutical dosage form and drug Delivery system. *Advances in Drug Delivery*. Volume II. Pharma. Med Press. 1-49.
- 26.Mikari BV, Mahadik KR, Korde SA. Formulation and evaluation of topical Liposomal gel for Fluconazole, *Indian J. Pharm.Sci.* 2010;44(4):324-325.
- 27.Dodov GD, Simonoska M. 5-Flurouracil in topical liposome gels for Anticancer treatment Formulation and evaluation. *Acta Pharm.*2003;53:241-250.
- 28.Jani R., Jani K, Setty C, Mallikarjuna P. Preparation and evaluation of Topical gel valdecocixib. *Int.J.Pharm.Sci.Research.* 2010;2(1):51-54.
- 29.Murthy R. Vesicular and Particulate Drug Delivery Systems. *Carrier Publication*; 105- 140.
- 30.Nayank SH, Nkhat PD, Yeole PG. *The IndianPharmacist*.2004;3(27):7-14.
- 31.Jain NK. Novel drug delivery system. *Pharma Times*. 1st Ed. May 2000; 21.
- 32.Misra AN. Controlled and novel drug delivery. *CBS Publishers and Distributors*. New Delhi.1997;107-109.
- 33.Nandu S, et.al. Topical drug delivey system. *Ind. J. Pharm. Sci.* 1998; 60(4):185-88.
- 34.Kumari P, Shankar C, Mishra B. *The Indian Pharmacist*. 2004;3(24):7-16.
- 35.. Lee VH, Robinson JR. A Handbook of Non-Perception Drug Delivery. *J. Pharm*152.24.
- 36.Chowdary PR, Gupta ME, Topical Dosage Forms. *The Eastern Pharmacist*. 1996.