INTERNATIONAL JOURNAL OF PHARMACEUTICAL SCIENCES
[ISSN: 0975-4725; CODEN(USA): IJPS00]
Journal Homepage: https://www.ijpsjournal.com

OPEN ACCESS

Research Article

Formulation and Evolution of Poly Herbal Foot Crack Heel Gel

Tulsi Ram Sahu[1]*, Chandraprabha Dewangan[2], Gyanesh Kumar Sahu[3], Harish Sharma[4]

[1,2,3]*Rungata Institute of Pharmaceutical Sciences and Research, Kohka, Kurud, Bhilai, 490024, Chhattisgarh, India.*
[4]*School of Pharmacy, Anjaneya University, Raipur.*

ARTICLE INFO

Published: 24 Mar. 2025
Keywords:
Crack Heel, Dry Skin, Cracking, Heel Fissures, Moisturizer.
DOI:
10.5281/zenodo.15074336

ABSTRACT

The human foot being an essential part of the body , the human foot is frequently neglect another essential organ used for movement (travelling ,running ,and jumping ,walking) the foot . the need to be attended . the main objective of our formulation was to design and produce a herbal foot crack gel that had healing ,antibacterial to protect on the cracking. The main motive of our formulation was to formulate and to develop the anti crack heel gel containing madhuca indica oil that have anti inflammatory property and microbial studies were carry on effectiveness gel. It was found to develop product is safe and effective against cracked heel without any side effect . The effectiveness of the gel was seen on volunteers crack heel by applied on 20 days.

INTRODUCTION

Cracked heels, also known as heel fissures, are a frequent foot ailment caused by dryness, a lack of moisture, pressure, or other skin disorders. They can cause discomfort, suffering, and infection if left untreated. Crack heel gels are carefully developed topical treatments that deliver intense hydration, repair damaged skin, and restore the skin's natural barrier. These formulations often include humectants, emollients, occlusives, and active substances that aid in healing and skin regeneration.[1] To provide optimal hydration and nourishment, an efficient crack heel gel must have a well-balanced combination of substances like as urea, glycerin, aloe vera, essential oils, and herbal extracts. Antimicrobial and anti-inflammatory medicines may also be used to prevent infections and reduce inflammation. This composition promises to give an efficient, quick-absorbing, and non-greasy treatment for healing cracked heels while also providing long-lasting moisture and protection.[2]

***Corresponding Author:** Tulsi Ram Sahu
Address: Rungata Institute of Pharmaceutical Sciences and Research, Kohka, Kurud, Bhilai, 490024, Chhattisgarh, India.
Email ✉: grkatkar2707@gmail.com
Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Topical Drug Delivery System

A topical delivery system is the material that brings a medicine into contact with and through the skin. The skin barrier presents a hurdle for topical medication administration. Topical delivery encompasses two categories of products: External topicals are smeared or sprayed into cutaneous tissues to cover the afflicted area. Internal topicals are applied to the mucous membrane, vagina, or anorectal tissues for local activity. Topical treatments typically provide localized effects by penetrating the skin's underlying layers.[3]

Transdermal

The skin serves as the body's initial line of defense against external stimuli. The skin is where aging signs are most visible. Although aging skin does not constitute a risk to an individual, it may have a detrimental impact on their psychological well-being. Furthermore, feet are an important aspect of an individual's body since they are constantly in contact with the outside world and experience friction. The lack of oil pores on the foot sole increases the risk of dry skin. In general, foot neglect can cause a range of ailments owing to improper footwear, and one may become infected as a result of dirt, fungi, or bacteria entering the body through various cuts and sores.[4]

MATERIALS AND MATHOD

To guarantee optimal healing, hydration, and protection, an effective crack heel gel must be formulated using a carefully selected set of chemicals and standardized technique. The materials employed in this study comprise crucial active elements such humectants, emollients, occlusives, and bioactive compounds, which work together to mend cracked heels. The methodology consists of a step-by-step formulation procedure that includes ingredient selection, gel base preparation, active component integration, and homogenization to produce a stable and effective product. Furthermore, numerous evaluation procedures are used to assess the final formulation's quality and efficacy, including pH measurement, viscosity testing, spreadability analysis, and skin compatibility research.[5]

Madhuca Indica (Mahua)

Fig 1: Madhuca Indica Oil

Synonyms: Madhuca longifolia, Bassia latifolia, Illipe latifolia

Biological Source: Madhuca indica is obtained from the flowers, seeds, and bark of the tree Madhuca indica (also known as Madhuca longifolia).

Family: Sapotaceae

Geographical Source: Found predominantly in India, Nepal, Sri Lanka, Myanmar, and Malaysia.

In India, it is commonly found in Madhya Pradesh, Chhattisgarh, Jharkhand, Odisha, Maharashtra, Tamil Nadu, and Uttar Pradesh.

Chemical Constituents: Flowers: Sugars, proteins, vitamins, glycosides, and flavonoids.

Seeds: Madhuca oil (fatty acids like palmitic acid, stearic acid, oleic acid, and linoleic acid). Bark: Tannins, saponins, and triterpenoids. Leaves: Alkaloids, flavonoids, and glycosides.

General Description:

Madhuca indica is a fast-growing, medium-sized deciduous tree that can reach 15-20 meters in height.

Uses: 1. Medicinal Uses: The bark is used for treating diarrhea, rheumatism, and diabetes.

The flowers have antioxidant and hepatoprotective properties. Madhuca oil is used for treating skin diseases, arthritis, and inflammation.[6]

2. Industrial Uses: Mahua oil is used in cosmetics, biofuel production, and candle making. The leaves are used as fodder for cattle

Turmeric

Fig 2: Turmeric powder

Synonyms: Curcuma longa, saffron Indian, Haldi, Curcuma, Rhizoma curcumae.

Biological source: Turmeric is the dried rhizome of curcuma longa Linn.

Family: Zingiberaceae

Geographical source: It is grown on a larger scale in India, China, East Indies, and Pakistan.

Chemical constituents: Curcumin is the active ingredient of the dietary spice turmeric, Resins, 5% volatile oils, fixed oils and acids.

General Description: The large, simple, oblong leaves of the perennial herb turmeric are borne on a short stem. Its oblong, ovate, or pyriform tubers, or rhizomes, are frequently branched. The rhizomes are orange on the inside, and yellowish brown on the outside.

Uses:

1. Used for disorders of the skin.
2. Clears the skin.
3. Has an anti-inflammatory property.
4. Improves skin health.
5. Act as anti-oxidant, anti-bacterial and soothing

Tea Tree Oil

Fig 3: Tea Tree oil

Synonyms: Melaleuca oil, Australian tea tree oil, Melaleuca alternifolia oil

Biological Source: Tea tree oil is obtained by steam distillation from the leaves and terminal branches of Melaleuca alternifolia.

Family: Myrtaceae

Geographical Source: Native to Australia, particularly in New South Wales and Queensland.

Chemical Constituents: The main bioactive compounds in tea tree oil include:

Terpinen-4-ol (30-40%) – responsible for antimicrobial activity-Terpinene (15-30%), α-Terpinene (5-15%),1,8-Cineole (Eucalyptol) – present in small amountsα-Pinene, β-Pinene

General Description: Tea tree oil is a pale yellow or nearly colorless essential oil with a strong, fresh, medicinal odor.

Uses: 1. Medicinal Uses: Antibacterial & Antifungal: Used for treating acne, athlete's foot, ringworm, and dandruff. Wound Healing: Helps in the treatment of cuts, burns, and insect bites. Oral Care: [6]

Honey

Synonyms: Madhu (Ayurveda), Mel (Latin), Natural honey, Apis mellifera honey

Biological Source: Honey is a natural sweet substance produced by honeybees (Apis spp.) from the nectar of flowers. It is collected, modified, and stored in the honeycomb of the hive.

Family: Apidae (Bee family)

Geographical Source: Honey is produced worldwide, with major producers including:

China, India, Turkey, Ukraine, Argentina, the United States, and Russia. Manuka Honey (New Zealand, Australia) Acacia Honey (Europe, North America) Honey (Yemen, Middle East), Eucalyptus Honey (Australia, Brazil)

Chemical Constituents: Carbohydrates (80-85%): Mainly fructose (38-42%) and glucose (30-35%) Water (15-20%) Proteins, amino acids, and enzymes: Inverts, diastase, glucose oxidation, Vitamins: B-complex (B1, B2, B3, B5, B6), Vitamin C

General Description: Color & Texture: Ranges from light golden to dark brown, depending on the floral source. Taste & Aroma: Varies based on the type of nectar used by the bees.

Uses of Honey: 1. Medicinal Uses: Antibacterial & Antiseptic: Used for treating wounds, burns, and ulcers. Cough & Cold Remedy: Acts as a natural cough suppressant. Digestive Health: Helps in relieving acid reflux, gastritis, and constipation.

Method of Preparation of gel

Phase one 0.5 g of carbopol 940 was dispersed 20 ml of distil water and also slowly heated than also add on a required quantity of poly ethylamine were dissolved and heated .one to two drop are add on triethnolamine further some time heat and also take some time phase two oil part use madhuca indica and tea tree oil slowly add and heated than then honey mixed in required quantity further add on turmeric extract. mixed on phase one and phase two proper heat and stirring both solution formulation for adjustment required skin pH and to obtain the gel required consistency. [7,8]

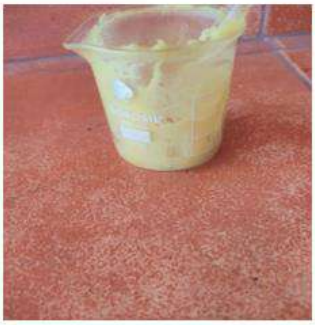

Fig No 4

Fig 5: oil contain solution

Fig 6; Heating Formulation

Formulation Table 1:

S no.	Ingredient	Minimum Quantity	Maximum Quantity
01	Madhuca indica oil	2.0	5.0
02	Honey	1.0	3.0
03	Turmeric	0.5	2.0
04	Tea tree oil	0.5	2.0
05	Poly ethylene glycol	2.0	4.0
06	Carbopol	0.5	1.5
07	Glycerine	1.0	3.0
08	Distilled water	Q.S.	Q.S.

Fig No 7: Polymers

Fig No 8: Prepared Poly Herbal Gel

Evaluation parameter of gel formulation

Visual inspection The gel were examined for their physical properties by visual inspection of colour, clarity, homogenesity, odour etc.

Appearance All the formulation of anti oxcidant was pale yellow / yellow in colour.

Consistency The consistency was checked by applying on the skin.

Greasiness The greasiness was assises by the application on the skin and the slide.

Determination of pH

The pH of gel was determined using digital pH meter by dipping the glass electrode completely into the gel and by using pH paper [[9]

Determination of viscosity

Viscosities of the formulate gel was determined using viscometer used for gel corresponding dial reading on the meter was noted.

Spreadability

It was determined by taking 0.5 gm of gel the glass slide over the 1cm of diameter. Second slide was placed. Weight of 500 gm was placed on it and waited for 5 minutes. The

increase in the diameter of gel was noted and average of 3 determinations were taken. It was

then calculated by using following formula. [10,11]

S = m. L/T

Where, S = Spread ability.
m = Weight on the upper glass slide.
L = Length moved on the glass slide.
T = Time taken.

Viscosity.

The sample was a placed in the beaker and rotated at 20 and 30 rpm on spindle no. 64. At each speed, the reading was recorded. An average of three readings was a taken. [12,13]

Moisture Absorption

A 100 ml beaker of water without adsorbent was placed in the desiccators and allowed to become saturated. The watch glass contained 10mg of crack gel, which was inserted in the desiccators. The watch glass with the prepared fractured gel was placed in a desiccators for 24 hours. [14,15]

Test for a Thermal stability:

The formulated gel for transferred into the glass bottle with the help of spatula and taped to settle at down the bottom. two and third capacity of a bottle was filled with the gel and the plug was inserted and tight the cap was tightened. the glass bottle was placed in the inside at the incubator at 4c for 48 hours. the glass bottle was removed for incubator and was checked for the difference. [16,17]

Test for a microbial growth:

Patri plate were prepared by the pouring agar media in it. the formulated cracked gel was inoculated in it by streak plate method. the patri plate was placed in the incubator and incubated 37c for 24 hours after 24 hours petri plate were taken out of and checked microbial growth.

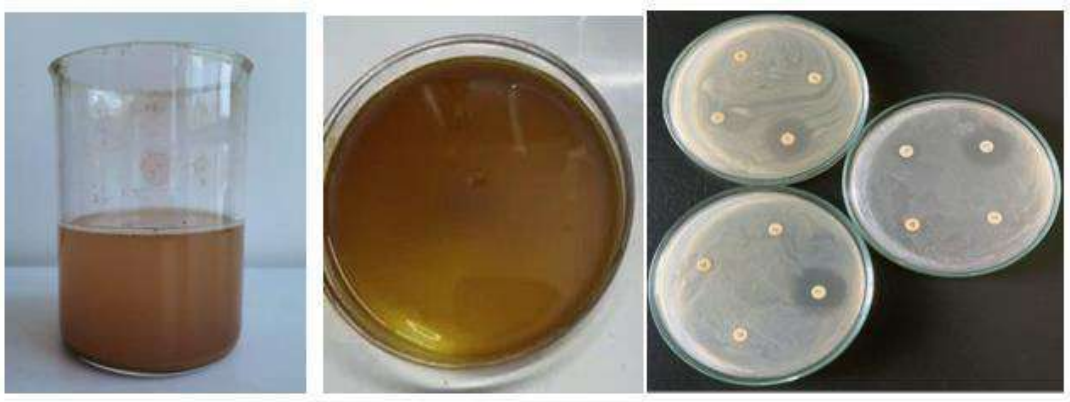

Fig 9: Microbial Growth

Skin Irritancy

In the test of patches of a gel were apply on the skin and effect to the skin on apply of gel was compared with the marketed products. [18,19]

Physical Properties Table 2:

S.NO	Parameter	Evolution(F1)	Evolution(F2)
01	Colour	Yellow	Yellow
02	Odour	Pleasant	Pleasant
03	Texture	Smooth	Smooth

Fig No 9: Treating Crack Heel

CONCLUSION

Herbal products are popular due to their lower risk of negative effects compared to synthetic alternatives. The herbal foot crack gel produced

satisfactory results across all evaluation parameters. The antimicrobial evaluation revealed no microbiological growth on the product. Thus, we may infer that the prepared herbal foot crack gel effectively treats cracked heels.

REFERENCES

1. Augustinea R, Hasana A, Biomedical Research Center, Qatar University, Doha, Qatar, chap multimodel applications of phytonanoparticles, 11: 202-203.
2. Edake AC, Deokar AV, Dindore OA, Dhule RB, Dhavne P, Dhakne K, Development and evaluation of polyherbal footcare cream, International journal of advance research, ideas and innovations in technology, 2019.
3. Nema RK (Director), Rathore S(Senior Lecturer), Dube B.K (Director), Textbook of cosmetics, CBS Publishers and Distributors, 43.
4. Dr Saraf Swarnalata (professor and director), Dr Saraf Shailendra (Professor), Cosmetics: A Practical Manual, Third Edition, 87-88.
5. Sharma PP, Cosmetics- Formulation, manufacturing and quality control, Fifth edition, Vandana Publications, Delhi, 652.
6. Dange S, Sudhakar G. Clinical efficacy of foot care cream in the management of foot cracks. Indian Medical4 Journal, 2009; 103(10): 350–353.
7. Viswanathan V, Kesavan R, Kavitha K and Kumpatla S. A pilot study on the effects of a polyherbal formulation cream on diabetic foot ulcers. Indian J Med Res., 2011; 134(8): 168-173.
8. Suh, E, Woo Y and Kim, H. Determination of Water Content in Skin by using a FT Near Infrared Spectrometer, Arch Pharm Res., 2005; 28(4): 458-462.
9. Pathan S, Hingane L. D. Formulation and Characterization of crack heel cream from aloe vera and beeswax. International journal for research trends and innovations, 7(6): pg. no 1245.
10. Edake AC, Deokar AV, Dindore OA, Dhul, Dhavne P, Dhanake K. Development and evaluation of polyherbal foot care cream. International journal of advance research, ideas,and innovation in technology, 5(2): 1225.
11. Extraction oil from lemongrass oil as a preservative for animal products. Journal of pharmacognosy and phytochemistry. Research gate, pg. no 27.
12. Shradha M, Gowda DV, Famna Roohi NK, Development and evaluation of medicated cosmetic cream to produce triple effect on skin for the treatment of uneven skin tone, international journal oof research in pharmaceutical sciences, 2019.
13. Patel NR, Dhumal RL, Mohite KL, Preparation and evaluation of multipurpose herbal cream, Advance journal of pharmaceutical life science, 2017.
14. Keshwar A, Keswar U, Deogirkar A, Dhurde SS, Deo V, Shrikhande BK, Formulation and development cream containing natural essential oils having mosquito repellent property, World journal of pharmaceutical science, 2018.
15. Chen MX, Alexander KS, Baki J, Formulation and evaluation of antibacterial creams and gels containing metal ions for topical applications, J Pharm, 2016.
16. Patil VV, Thorat YS, Kote NS, Hosmani AH, Formulation and evaluation of crack cream from plant extracts, International journal of current pharmaceutical research, 2020; 12: 3.
17. Dhase A, Khadbadi S, Saboo S, Formulation and evaluation of vanishing herbal cream of crude drug, American journal of ethnomedicine, 2014; 1(5): 313-318,.
18. Mithal BM, Saha RN, A Handbook of cosmetics, Vallabh prakashan, 89.

19. Guleri KT, Preet KL, Formulation and evaluation of topical gel of aceclofenac, Journal of drug delivery and theurapatics, 2013.
20. Ashwini SD, Somishwar SK, Shweta SS, Formulation and evaluation of vanishing herbal cream of crude drugs, American journal of ethnomedicine, 2014.

HOW TO CITE: Tulsi Ram Sahu*, Chandraprabha Dewangan, Gyanesh Kumar Sahu, Harish Sharma, Formulation and Evolution of Poly Herbal Foot Crack Heel Gel, Int. J. of Pharm. Sci., 2025, Vol 3, Issue 3, 2089-2097. https://doi.org/10.5281/zenodo.15074336