



Formulation And Evaluation Of Herbal Foot Crack Heel Cream

1Siddhi Sunil Jadhav, 2Supriya Dayanand Khutwad

1Student , 2Teacher

1Navsahyadri Institute of Pharmacy,Pune.,

2Navsahyadri Institute of Pharmacy ,Pune.

❖ Abstract:-

Even though being an essential part of the body, the human foot is frequently neglected. Another essential organ used for movement (such as travelling, running around, and jumping) is the foot. They need to be attended to. The main objective of our formulation was to design and produce a herbal foot crack herbal cream that had healing, antibacterial, and antimicrobial qualities obtained from mint and fenugreek extract. A multitude of anti-inflammatory ingredients were used, and microbiological analyses were conducted to ascertain the effectiveness of the cream. It was found that the developed solution was risk-free, effective, and efficient in treating cracked heels. The subject's broken heels after fifteen days of use proved the effectiveness of the a cream.

❖ Keywords:-Mint extract, Fenugreek extract,Cracked heel

❖ Introduction:

Unlike the rest of our body, the skin of our feet is normally dry. Because our foot skin lacks oil glands, it is dependent on the hundreds of millions of the sweat glands to maintain moisture levels.[1,2]. The intensity of dry feet can vary, ranging from moderate, transient skin that is dehydrated to extreme dry skin that results in further issues. Many factors can contribute to dry skin, but there are steps we can do to avoid it, such moisturizing our feet and avoiding from scratching or scraping them. When compared to younger females, older women tend to have broken heels. In a similar vein, this issue affects older women more than men.

Foot cracks allow germs to enter the body, which can worsen foot ulcers, block wounds, and even result in the amputation. The outermost protective layer of the epidermis, known as the stratum corneum, is made up of dead cells. It serves as a barrier to keep the underlying tissue safe from chemicals, mechanical stress, dehydration, and infection. This thickness ranged from 10 to 40 μm and varied across the body.[3,4,5] The right moisturizing component gives the feet the moisture they require, but a special technique also needs to monitor the feet's hydration patterns. The hydration power used to be inversely associated with the formula's total fatty matter, however the relationship frequently led to formulators being misled. The other fraction determines the moisturizer/hydration pattern. Additionally, the wide variety of unique raw ingredients that are now on the market have a direct correlation to moisture lock and hydration properties, without having an effect on the overall amount of fat. We have created a special formula for foot cream that has a greater hydration lock characteristic and provides more hydration to the foot. The purpose of this study is to assess the hydration lock and hydration property of foot cream using a

membrane called the carapace. Skin moisture meters have been developed using a variety of methods. The novel technique for determining the water content of the stratum corneum was created by Suh et al. [3]. The carneometer monitors the electrical conductivity behavior of the skin using the electric conductance concept as its foundation. Conductance and skin moisture content are intimately connected. Our exclusive foot healing formula has been created, and its efficacy is evaluated against industry benchmark samples. The goal of this study is to create a special foot cream. to compare the effectiveness to top benchmark samples and maintain the moisture content for up to six hours.

❖ Transdermal System

The body's first line of protection against exposure to the outside world is the skin. The skin is where aging indications are most noticeable. Although aging skin does not pose a hazard to an individual, it might negatively impact their psychological well-being.[6] Furthermore, feet are a vital part of the body of an individual that are frequently in contact with the outside world and friction. The absence of pores for oil on the foot sole makes it more prone to dry skin. Generally speaking, foot neglect can result in a variety of illnesses because due to inappropriate footwear, and one may become infected as a result of dirt, fungi, or bacteria entering the body through various cuts and wounds. According to reports, Staphylococcus epidermis bacterium is the cause of foot odor, which is caused by bacterial breakdown. Additionally, diseases like Candida albicans, Escherichia coli, and Staphylococcus aureus are caused by bacteria that live in the foot.[7,8] The human foot is a vital organ that is subjected to a lot of environmental exposure and friction [9]. Often used to clean, beautify, or alter the look of the skin on the body, cosmetics are administered via rubbing, spraying, or pouring.[10] The absence of oil glands causes the skin of the feet to become dry and perhaps crack. Numerous illnesses can be caused by wearing inappropriate footwear and being negligent. Dirt and bacteria from the outside getting into the gap through wounds and scratches can cause an infection.[11] Topical medications, such as gels and lotions, are usually applied topically to the skin. They could be categorized as cosmetic or medicinal products. They provide a barrier to protect the skin.[12] Neglecting your feet can lead to a few of the subsequent uncomfortable situations: The symptoms include the toenail bed becoming softer, moist skin irritation, creating an ideal habitat for fungal infections, a permeating stench from perspiration and skin debris produced by bacteria, a burning and itching feeling in between the toes, and painful, swollen, and fatigued feet. The following characteristics can be found in products for foot care: moisturizing, callus-softening, antibacterial, antifungal, freshening, refreshing, and deodorizing[13]. The Indian medicinal material [14] provides comprehensive details on traditional medicine, drugs derived from plants found in nature, and other aspects of naturally occurring items of medical significance.

Crack Heel:



Fig:-1.1 Crack Heel

Heel is another word for a cracked heel. Fissures are a frequent foot condition that can be painful or uncomfortable. They are the result of skin that is dehydrated and are often accompanied by greater

skin thickness and, on sometimes, brown or yellow calluses that form along the edge of the heel. Cracked heels frequently have more of a cosmetic problem. Cracked heels can result from a variety of factors, including inadequate moisture content or footwear that is exposed. Understanding the problem's genesis can enable you to determine whether you noticed any signs, such as lack of moisture thickening around heels, cracked skin, or soreness in the heels. It can also prevent further relapses.

Most frequent reasons for cracked heels: -There are a number of potential If it's too damp, you may receive a bacterial or fungal illness. Toenail fractures might arise from this. People who walk barefoot or wear open shoes a lot are more likely to experience dry skin. Individuals who don't put on socks for men in their shoes Water may remove the natural oil from your feet's skin, leaving it feeling rough or dry.

Incorrect fitting of shoes:-Cracked feet can result from bearing shoes that are either too tiny or too large.

Genetics:-Cracking heels might be inherited from callus, which is dense and dry by nature. [15]

To withstand the weight of the body, the thick stratum cornea that makes up heel skin. There's a lot of losing water on the skin's surface because the outermost layers of the feet have a lot of ermine sweat glands and a handful of sebaceous glands [16]. Poor and illiterate people wear shoes incorrectly. It has been discovered that sociocultural behaviour's like going barefoot, skipping socks (particularly on females), and presenting foot lesions later than usual all contribute to the development of heel fissures and hyperkeratosis in the Indian population [17]. Prolonged standing (especially on hard surfaces) and wearing open-heeled shoes, which allow the sole of the foot to expand and enhance pressure, are two of the main reasons. Diabetes and other illnesses make it easier for dry skin to develop. Additionally, cracked heels may result from eczema and psoriasis. Cracked heels may be the result of obesity. Footwear that comes into constant touch with water may lose its natural oil and become harsh and dry. Cellulitis can develop from severe heel cracks if they become infected [18]. Systemic illnesses, open-back shoes, and dry hyperkeratosis skin can also cause it [19]. The development of thick callus is one of the main reasons. Neglect and carelessness with regard to foot care are the main causes of foot disorders [20]. Although many dermatological disorders may exhibit hyperkeratosis as a component of their pathophysiology, the most prevalent cause of the medical problem on the foot is as a reaction to the intermittent stresses of mobility [21].

❖ Methodology :-

❖ Procedure for Extraction of Fenugreek:-

- **Decoction:-**Decoction is an extraction technique where the compounds in plant or herbal material—which can include stems, roots, leaves, bark, and rhizomes—are dissolved by boiling the material. It is the most often used preparation technique in many systems of herbal medicine.
- **Extraction of Trigonella foenum graecum:-**Trigonella foenum graecum leaf extract was employed since it was readily available and had therapeutic benefits. They gathered fresh leaves. After performing a double DW and air drying at room temperature, they were completely sterilized with running water in order to remove any dirt and other infected organic substances. A beaker filled with 50 cc double DW was filled with around 5 grams of finely chopped leaves, which were then cooked for 30 minutes. After the extract was allowed to cool, it was filtered using Whatman filter paper No. 1 and kept cold (40 C) until needed again.

❖ Procedure for Extraction of Peppermint :-

- **Decoction:-** Decoction is an extraction technique where the compounds in plant or herbal material—which can include stems, roots, leaves, bark, and rhizomes—are dissolved by boiling the material. It is the most often used preparation technique in many systems of herbal medicine.
- **Extraction of Mentha piperita L. :-**Mentha piperita L. extract from the leaves was employed because it was readily available and had therapeutic benefits. They gathered fresh leaves. After performing a double DW and air drying at room temperature, they were thoroughly sterilized with running water in order to remove any dirt and other contamination of organic substances. A beaker filled with 50 cc double DW was filled with around 5

grams of finely chopped leaves, which were then cooked for 30 minutes. After the extract was allowed to cool, it was filtered using Whatman filtration paper No. 1 and kept cold (40 C) until needed again.

❖ **Formulation of Herbal Foot Crack Heel Cream:-**The formulation of the cream contains the following contents:

- Fenugreek :- It is used for its antibacterial, antimicrobial, antifungal, antioxidant and wound healing properties.
- Peppermint: - It is used for its antibacterial, antimicrobial, moisturising, cooling.
- Glycerine:-It is used in the formulation as humectants as well as soothing agent.
- KOH (Potassium Hydroxide):- It provides emulsifying property to the formulation.
- Stearic acid:-It is used as a cream base in the formulation.
- Cetyl alcohol:- It has different uses like skin softening, soothing, and healing of the dry skin.
- Triethanolamine:- It is used for the pH adjustment of the formulation.
- Borax:-It is used as Emulsifier, buffer and preservative.
- Cocoa Butter:-It is used for the moisturisation, hydration, cure and slowing down of ageing of the skin.
- Rose water:- It is used as perfuming agent in the formulation.
- Lanoline:- These ingredients act as a lubricant on the skin surface, which gives the skin soft and smooth appearance. Lanolin helps to form emulsion and blends well with other substances used in cosmetic.
- Beeswax:-It is used as a cream base in the formulation.

❖ **Formulation Table: -**

Sr.no	Ingredients	F1	F2	F3
1	Fenugreek Extract	5 ml	1 ml	5 ml
2	Peppermint Extract	5 ml	1 ml	5 ml
3	Glycerine	3 ml	3 ml	3 ml
4	Potassium Hydroxide	0.03 gm	0.03 gm	0.03 gm
5	Stearic acid	-	2 gm	4 gm
6	Beeswax	6 gm	-	-
7	Cetyl alcohol	0.05 gm	0.05 gm	0.05 gm
8	Coca butter	0.3 gm	0.3 gm	0.3 gm
9	Triethanolamine	0.12 ml	0.12 ml	0.12 ml
10	Borax	0.08 gm	0.08 gm	0.08 gm
11	Lanoline	-	1 gm	2 gm
12	Rose water	0.1 ml	0.1 ml	0.1 ml

Table no.1.1 List of Ingredients for Cream Preparation

❖ **Procedure:-**

Oil in water (o/w) emulsion based cream (semisolid) formulation was formulated.

- The emulsifier (stearic acid/Beeswax) and other oil soluble components (cetyl alcohol, Cocoa Butter) were dissolved in oil phase (Part A) and heated at 75°C.
- The preservatives and other water soluble components (borax, triethanolamine, glycerine, KOH, fenugreek extract, peppermint extract) were dissolved in aqueous phase (Part B) and heated to 75°C. After heating, the aqueous phase was added in portions to oil phase with continuous stirring until cooling of emulsifier takes place.



Fig no:- 1.2 Oil Phase.



Fig no:- 1.3 Water phase added in Oil phase

❖ **Three Batches were prepared using Herbal Extract:-**



Fig no 1.4:-Three batches F1,F2,F3 prepared using herbal extract

❖ **Evaluation Test :-**

1. Colour and odour: - Visual inspection is used to assess the physical characteristics of Herbal the foot Crack Cream, such as its colour and smell.

2. Consistency:- Smoothness of the Herbal Foot Crack Heel Cream was noted. The consistency of the cream is wonderful.

3.Appearance:- Cream was evaluated based on its colour, pearlescence, and roughness.

4. Washability:- To do this test, just rinse the cream what has been applied with water.

5. Determination of type of smear:- By using the cream onto the skin barrier of human volunteers, it was ascertained. Following cream application, the kind of film or smearing that developed on the skin was examined.

6.Homogeneity:- The uniformity of the formulations was assessed by touch and appearance. [22]

7.pH:- Standard buffer solution was used for pH metre calibration. Using a PH metre, the preparer Herbal Foot Crack Heel Cream's pH was determined. After weighing and dissolving around 0.5g of cream in 50 ml of water, the pH of the mixture was determined.

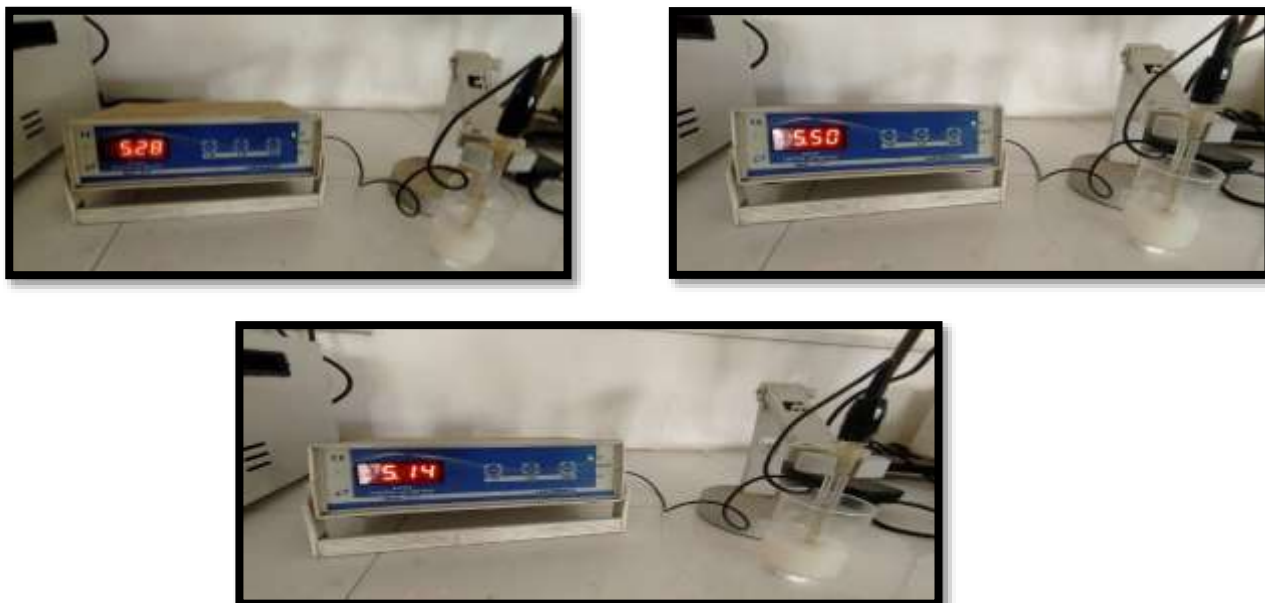


Fig no 1.5 :-PH measurement

8.Spreadability:- The spreadability test is used to assess the force of application, or the force used to apply lip balm. The most popular technique for figuring out and measuring the spreadability of semisolid preparations is the parallel-plate approach. This method's simplicity and relative affordability are its merits. In order to conduct this examination, 2.5 grammes of cream were placed between two glass slides, compacted to a consistent thickness, and then weight was added to the pan. Spreadability was measured as the amount of time needed to separate the two slides, or the amount of time the upper glass slide travelled over the bottom slide. Both qualitative and quantitative estimating can be performed; the fundamental formula for quantitative estimation is provided here.

The formula for calculating spreadability (S) is

$$S = m \times L / T,$$

where m is the mass of foot crack cream put between the glass slide,

L is the length moved on the glass slide, and

T is the spread time.



Fig no 1.6- Spreadability

9.Viscosity:- The formulation's viscosity was measured using spindle number seven and a Brookfield viscometer operating at 100 rpm. The 50g sample was put in a beaker and given five minutes to equilibrate. The equivalent dial reading on the viscometer was recorded prior to measuring the dial reading with a T-D spindle (no.7) at 100 rpm at speed. At room temperature, the measurements were performed in triplicate. The Brookfield viscometer provides the dial measurements multiplied directly by factors. The viscosity was given in centipoises in the catalogue.



Fig no 1.7 :-Viscosity measured

10.Irritancy test:- On the dorsal surface of the left hand, mark a square centimetre. After applying the cream to the designated area, the time was recorded. For a whole day, any erythema, edema, or irritability was noted and recorded at regular intervals.It turned out to be non-irritable.

❖ **Result:-**

Sr.no	Parameters	F1	F2	F3
1	Colour	Cream Colour	Yellowish Brown	Off White Colour
2	Odour	Pleasant	Pleasant	Pleasant
3	Appearance	Good	Good	Good
4	pH	5.28	5.50	5.14
5	Spreadability	Poor	Good	Good
6	Washability	Not easily Washable	Washable	Washable
7	Homogeneity	Homogenous	Homogenous	Homogenous
8	Emulsion Type	O/W	O/W	O/W
9	Viscosity	1811.0 cp	1811.0 cp	6758.3 cp
10	Irritation	No Irritation	No Irritation	No Irritation
11	Stability	Not Stable	Stable	Less Stable

Table no:-1.2 Result

❖ **Discussion:-**

The present work is concerned with the formulation of Herbal Foot Crack Heel Cream using extract of Fenugreek and Peppermint.Fenugreek shows antimicrobial,healing antifungal activity.Peppermint shows Soothing,Cooling ,antimicrobial and antibacterial activity which is mainly responsible for foot disorders. From subjective evaluation, it is found that the foot cream is having good appearance, spreadability and provide necessary protection against infection and provide good healing property for cracked heels.

From the Evaluation test it is clear that F1 batch is not stable as compare to F2 and F3 batch.F2 batch is more stable than F3 because from first day of the formulation it is stable till 30 days of observation. so it is standard batch.

Conclusion:

F1, F2 and F3 batches were prepared.Among all three batches F2 batch passed all the tests.Objective of the preparation was to formulate Herbal Foot Crack Heel Cream.This might be rational basis for use of herbs in preparation of Cream and use of these compounds in making Crack Heel Cream.F2 has less amount of extract as compared to F1 and F3 batches, F1 did not passed the test due to large quantity of beeswax was added in the formulation so it is not easily spreading on the foot .F2 found stable due to addition of proper quantity of

Stearic acid and Lanoline and the quantity of the main active pharmaceutical ingredient . Therefore, it was found that F2 batch is the perfect among all prepared batch it contains perfect concentration of extract as compared to other 2 Batches.

REFERENCES:-

1. Dange S, Sudhakar G. Clinical efficacy of foot care cream in the management of foot cracks. Indian Medical Journal, 2009; 103(10): 350–353.
2. 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.
3. 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.
4. Arimoto H., Egawa M and Yamada Y. Depth profile of diffuse reflectance nearinfrared spectroscopy for measurement of water content in skin, Skin Research and Technology, 2005; 11: 27–35.
5. Polaskova J., Pavlackova J., Vltavska P., Janirkova G., Kasparikova V. and Janis R. The moisturize influence of the commercial cosmetics on the foot skin. Advances in Environment, Biotechnology and Biomedicine, 2012; 127: 272-277.
6. Dhase A, Khadabadi S. and Saboo S. „Formulation and evaluation of Vanishing Herbal cream of crude drug“ American Journal of Ethnomedicine, Vol. 1, Page no. 5, 313-318.
7. Wilkinso J., Moore R.; 1982, cosmeticology; 7th edition; George Godwin Publication, Page no. 191-192.
8. Kritikar K., Basu B.; 1981; Indian Medicinal Plants; 2nd edition; International Book Distributors; Vol. 3, Page no. 2318.
9. Campion K. ; A Woman’s Herbal; 1st ed.; 1988; 88
10. Augustine R, Hasana A, Biomedical Research Center, Qatar University, Doha, Qatar, chap multimodel applications of phytonanoparticles, 11: 202-203.
11. Edake A, Deokar A, Dindore O, Dhule R, Dhavne P, Dhakne K, Development and evaluation of polyherbal footcare cream, International journal of advance research, ideas and innovations in technology, 2019.
12. Nema R(Director), Rathore S(Senior Lecturer), Dube B.K (Director), Textbook of cosmetics, CBS Publishers and Distributors, 43.
13. Anton C. Groot D, Weyland W, Natar JP; Unwanted Effects of Cosmetics and Drugs used in Dermatology; 3rd ed.; Elsevier Publishers; 1994; 558
14. Khandelwar K.; Practical Pharmacognosy : techniques and experiments; 19th ed.; Nirali Prakshan; 2008; 153-155
15. <https://amoge.com/blogs/problems&solutions>
16. Choi J, Kim E, Jang S, Kim A, Lee T, Lee H. A new technique for evaluating heel xerosis grade and the effects of moisturizer on heel skin dryness. Skin Res Technol. 2018;24(4):557-61.
17. Harrison-Blount M, Hashmi F, Nester C, Williams A. The prevalence of foot problems in an Indian population. The Diabetic Foot Journal. 2017;20(2):95-102.
18. Majeed M, Vaidyanathan P, Mundkur L, Majeed S, Sable P, Vuppala KK. Efficacy of Centella Asiatica Extract in the Management of Cracked Feet: In Vitro and Clinical Evidence. World Journal of Pharmacy and Pharmaceutical Sciences. 2016;5(12):983-94.
19. Pawar M. The title of the paper: Treatment of painful and deep fissures of heel with topical timolol. J Am Acad Dermatol. 2020.

20. Polaskova J., Pavlackova J., Vltavska P., Janirkova G., Kasparkova V. and Janis R. The moisturizeinfluence of the commercial cosmetics on the foot skin. *Advances in Environment, Biotechnology and Biomedicine*, 2012; 127: 272-277.
21. Bristow I. Hyperkeratosis of the foot: part 1. *Podiatry Review*.2015;72(1):16-23.
- 22.Pawar A., Gaud R.S.,*Modern Dispensing Pharmacy*“, Second edition, Career Publication, April 2005, Page no. 227.

