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Research Paper

Formulation and Evaluation of Herbal Foot Cream

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ABSTRACT
The aim of the present study was to formulate the herbal foot cream prepared by the leaf extract of Mimosa pudica Linn and to evaluate its wound healing and antibacterial activity. Two o/w formulation base mainly Fb1 and Fb2 were prepared by incorporating different concentrations of mineral oil. The formulation base Fb2 was found to be more appropriate for the preparation, then varying concentrations of leaf extract were incorporated into the Fb2 base for the all four cream. The best formulation F4 was determined, after assessing its antibacterial activity against E. coli in vitro and performing scratch wound healing tests on all four formulations. The findings showed that the F4 formula displays notable antibacterial effects by examining the inhibition zone in comparison to Gentamicin, along with boosted wound healing attributes by higher cell movement and coverage in exposed cells after 72 hours in compared to control cells.

KEYWORDS: *Mimosa pudica Linn, Foot cream, Scratch assay.*

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I. INTRODUCTION

Herbal Cosmetics, defined as the products that are formulated by using various cosmetic ingredients to form the base in which one or more herbal ingredients are used to treat or protectfrom skin ailments.[1] Recently, based on Indian herbs a wide range of cosmetic and toiletry preparations has been formulated.[2]In addition to historic documents, Indian herbs havebeen used in certain contemporary experiments for use in personal care products.[3]Feet are the important organ of human body and are exposed to a lot of friction and external environment.[4] Foot lacks oil glands therefore reliance on thousands of sweat glands which maintain moisture.[5] Our feet require extra care for protection, comfort and beautification because the skin is drier than the rest of the body.[6]Different types of foot care products such asfoot cream have refreshing, anti-pruritic, deodorizing and antiperspirant, cleansing, antiseptic and an antifungal properties keeps the feet from various diseases such as nail fungus, athlete'sfoot, bunions, corns, calluses, cracked heels and pressures.[7]Heel cracks are a common foot issue. It appears as breaks and cracks in the thick, dry skin on the bottom of your heels, which leads to discomfort and pain. If the cracks are small, they usually just cause discomfort and may not look good.[8]

Wound healing is the process of cell contraction, migration, and readhesion following skin trauma or injury. Platelet aggregation, blood clotting, fibrin production, the inflammatory response to damage, changes in the ground substances, angiogenesis, and re-epithelialization are all involved in wound healing.[6] The creation of scars marks the end of the healing process,which is not achieved until collagen has strongly knitted the damaged area.[9] The presence of free radicals may delay the healing process of wounds by causing harm to the surrounding skintissues.[10] People in India have been treating wounds with remedies derived from plants and animals forages.[11] This practice is known as Ayurveda, and it is a popular branch of Indian medicine. Naturalproducts have been utilized for generations in many regions of the world; due to their generallyless adverse side effects, natural products are starting to gain the same importance as alternativemedicine.[12]

Mimosa pudica Linn also called sensitive plant, sleepy plant, action plant, touch me not. It is acreeping annual or perennial flowering plant of the pea or legume family Mimosaceae. The entire plant is used, especially the roots, leaves and flower in the treatment of several diseasessuch as dysentery, leprosy, pile, skin diseases, fever, burning sensation, cancer, oedema and also have properties that includes anti-inflammatory, hepatoprotective, wound healing, analgesic antidiabetic etc[13].

II. MATERIALS AND METHODS

Preparation of plant extract: Leaves of *Mimosa pudica* L. were pulverized after being shade-dried. Acetone: Water (7:3) was used in a cold maceration process to extract the powdered substance, which was then filtered after 72 hours. To remove the chlorophyll, the filterate was treated with petroleum etherin a separating funnel. The ether layer was decanted and to the remaining layer, saturated solution of sodium chloride and ascorbic acid were added followed by filtration. To the filtrateEthyl Acetate was added in a separating funnel. After gradual shaking, ethyl acetate solvent was decanted which gives the flavonoid and was evaporated. The aqueous layer in the funnel was concentrated by distilling off the solvent which gives tannins.[14]

Formulation of Herbal Foot Cream: Oil in water (o/w) emulsion based cream was formulated using the ingredients shown in the table given below. The oil phase components (Stearic acid, Beeswax, Cetyl alcohol, Mineral oil) as well as the water phase components (TEA, methyl paraben, Propyl paraben, Glycerin, PEG- 200, Distilled water) were weighed accurately and heated to 70º C in a borosilicate beakerseparately .After heating, the herbal extract was added to the water phase. Then the oil phase was added in portions to the aqueous phase with continuous stirring until the cream is cooled.Finally, the prepared cream was transferred and stored in a suitable airtight container[15].

Table No: 1 Composition of Herbal Foot Cream.

SI.NO	INGREDIENTS	F_{b1}	F_{b2}	F_1	F_2	F_3	F_4
1	Stearic acid	2gm	2gm	2gm	2gm	2gm	2gm
2	Cetyl alcohol	0.2gm	0.2gm	0.2gm	0.2gm	0.2gm	0.2gm
3	Beeswax	0.4gm	0.4gm	0.4gm	0.4gm	0.4gm	0.4gm
4	Isopropyl myristate	0.4gm	0.4gm	0.4gm	0.4gm	0.4gm	0.4gm
5	Mineral oil	0.6ml	1ml	1ml	1ml	1ml	1ml
6	Propylparaben	0.04gm	0.04gm	0.04gm	0.04gm	0.04gm	0.04gm
7	Triethanolamine(TEA)	0.28ml	0.28ml	0.28ml	0.28ml	0.28ml	0.28ml
8	PEG-200	1ml	1ml	1ml	1ml	1ml	1ml
9	Glycerine	1ml	1ml	1ml	1ml	1ml	1ml
10	Methylparaben	0.04gm	0.04gm	0.04gm	0.04gm	0.04gm	0.04gm
11	Distilled water	14.18ml	13.78ml	12.78ml	11.78ml	10.78ml	10.28ml
12	Mimosa pudicaextract	_	_	1ml	2ml	3ml	3.5ml

Evaluations of Herbal Foot Cream

1) **Organoleptic Evaluation:** Organoleptic parameters like colour, odor, smell, texture, state were evaluated.

2) **Viscosity**: Viscosity is measured to determine the consistency and long term stability of the prepared formulation. The viscosity was determined by using Brookfield Viscometer, spindle no. 64 at 25rpm.

3) **pH:** Accurately weighed 5gm of prepared cream was transferred into a 100ml beaker,and 45ml of water was added to dissolve the cream. The pH was determined using pH meter at room temperature.

4) **Spreadability**: Spreadability of cream was determined by glass slide method. Certain amount of cream was added on a glass slide and another slide was placed on the top of the slide. A weight of 20gm was placed over the upper glass slide and note the time taken for moving the upper slide to separate completely from fixed slide. Spreadability can be determined by using the formula;

S=M*L/T

Where,

S= Spreadability

M= Weight tied to the upper slide

L= Length of glass slide

T= Time taken to separate the slides.

5) Dye Solubility Test: Dye test is used to determine the type of emulsion formed. The cream was mixed with water soluble dye (Amaranth) and observed under microscope. Appearance of red colour on the continuous phase indicates o/w type of emulsion and appearance of red colour to the scatteredglobules along with colorless continuous phase indicates w/o type emulsion.

6) ***In-vitro* antimicrobial activity:** It is evaluated by agar well diffusion method. The agar plate surface was inoculated by spreading a volume of *E. coli* over the entire agar surface. Then, with a diameter of mm was

punched septically with a sterile cork borer or a tip, and a volume (20-100 µl) of the formulation was introduced into the well. Then, agar plates are incubated under suitable conditions. The antimicrobial agent diffuses in the agar medium and inhibits the growth of the microbial strain tested. The zone of inhibition of bacterial growthby the test was compared with the zone of inhibition by the standard Gentamicin.

7) **Scratch wound healing assay:** It was performed in L929 (Mouse Fibroblast) cell line and were trypsinized and seeded at a density of 200,000 cells per well into 12-well plate for 24 h incubation. The scratch wound was made on the cell line by using a sterile 1 mL pipette tip through a pre-marked line, and incubated with the sample and effect was observed microscopically between scratched wound areas for 0, 24, 48 and 72 hours. The effectwas measured in terms of area using MRI image analysis software[15]

8) **Stability Studies:** Stability studies were carried out as per ICH guidelines. A sufficient quantity of optimized formulation was kept in a glass vial and it was subjected to accelerated stability studies for period of 6 months using stability chamber at a temperature of 40 ±2°C and RH 75±5%, The physical stability of the herbal foot cream was inspected at initial, third month and sixth monthby checking pH, viscosity, spreadability, dye test, antibacterial and wound healing activity.

III. RESULTS AND DISCUSSION

All the developed foot cream formulation were found to be homogeneous with Golden yellow in colour with characteristic odour. The observations of evaluation parameter of the *Mimosa pudica* Linn cream is given below.

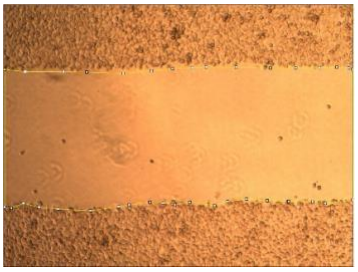
Table 2: Observations of evaluation parameters.

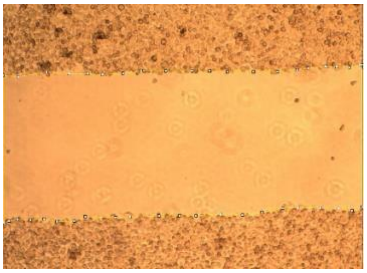
Parameter	F_1	F_2	F_3	F_4
Viscosity	32211 cps	33523 cps	31560 cps	29990 cps
pH	5.82	5.65	5.37	5.24
Spreadability	21.25 g.cm/s	19.79 g.cm/s	22.26 g.cm/s	24.00 g.cm/s
Dye Solubility test	o/w	o/w	o/w	o/w
In vitro antimicrobial test	10 mm	11 mm	13 mm	14 mm

Scratch wound healing assay was performed for all four formulations in L929 cell lines. The effect of sample and control on scratch wound was observed microscopically for 0h, 24h, 48h, and 72h. The effect was measured in terms of area using MRI image analysis software and the observed images are given below.

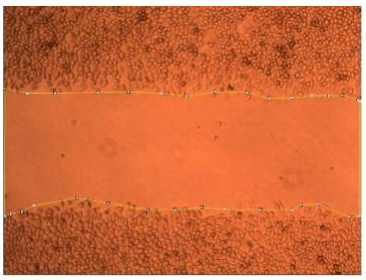
HOURS **CONTROL** **SAMPLE**

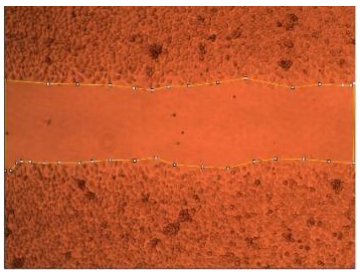
0 hour





24 hours





48 hours

72 hours

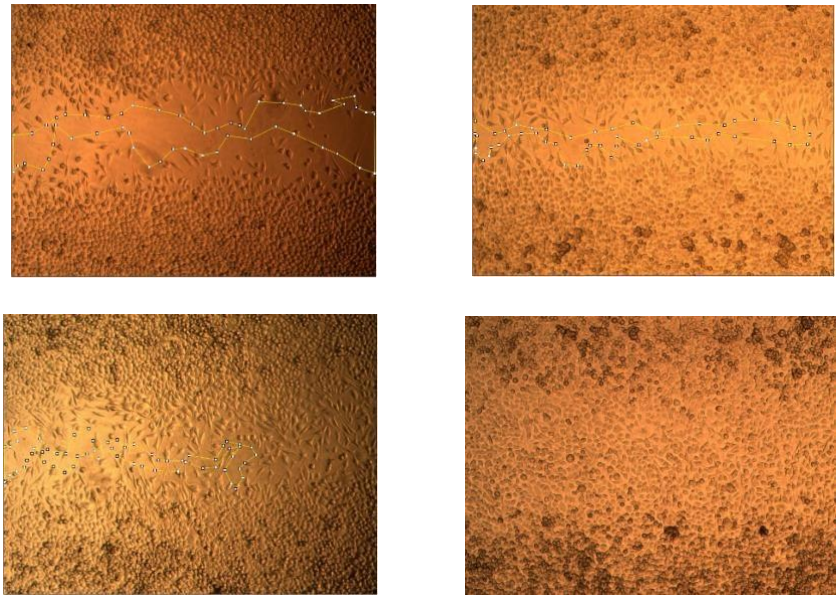


Fig .1 MRI- images

Table 3: The measurements of wound area at different time intervals of control and sample

Time interval (hrs)	Wound area (px)
C 0th	2664921
S 0th	2678338
C 24th	2123106
S 24th	1490190
C 48th	576417
S 48th	264516
C 72nd	206103
S 72nd	0

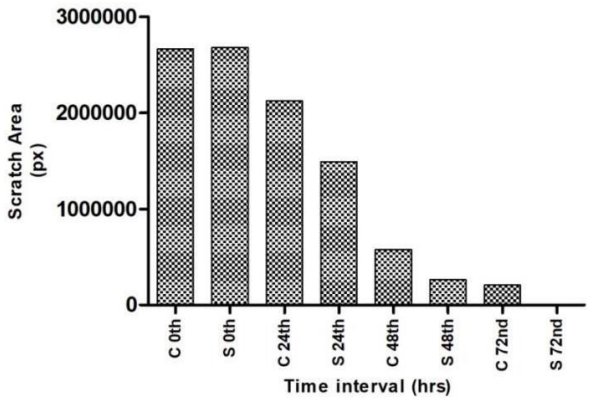


Fig 2. Graphical representation illustrating the wound healing capacity

IV. CONCLUSION

Herbal foot cream containing *Mimosa pudica* Linn (Mimosaceae) has been developed for the treatment of cracked heels. The flavonoid and tannin extract obtained from the leaves of *M. pudica* were prepared. The four foot cream formulations F_1, F_2, F_3, F_4 were prepared by varyingleaf extract concentrations These formulations were evaluated by various parameter includingantibacterial and wound healing property. The *in vitro* antibacterial activity of all preparationswas determined against *E. coli* and the activity was compared with standard gentamicin. Wound healing activity of the foot cream was determined by using scratch wound healing assayand interpreted the result in terms of cell migration in the wound area which was produced in the L929 cell line.

From the results of above study, the optimized herbal foot cream was found to be F_4 which showed significant antibacterial and wound healing activity. Thus, it can be concluded that thecream was effective for cracked heels and has a great impact in the future and would be a promising approach in skin care and treatment.

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REFERENCE

[1]. Brown TM, Krishnamurthy K. Histology, Dermis. StatPearls Publishing; 2022 Nov 14.
[2]. Saini S, Dhiman A, Nanda S. Traditional Indian medicinal plants with potential wound healing activity: a review. Int J Pharm Sci Res. 2016; 7(5):1809.
[3]. Builders PF, Kabele-Toge B, Builders M, Chindo BA, Anwunobi PA, Isimi YC. Wound healing potential of formulated extract from Hibiscus sabdariffa calyx. Indian J Pharm Sci. 2013; 75(1):45
[4]. Han K, Bae K, Levine N, Yang J, Lee JS. Biomechanical Effect of Foot Orthoses on Rearfoot Motions and Joint Moment Parameters in Patients with Flexible Flatfoot. Med Sci Monit. 2019; 25:5920-5928.
[5]. Card RK, Bordoni B. Anatomy, Bony Pelvis and Lower Limb, Foot Muscles. StatPearls Publishing; 2023 Apr 8.
[6]. Sarabahi S, Tiwari VK. Principles and practice of wound care. JP Medical Ltd; 2012 May 15.
[7]. Lalita, Gupta S. Creams: A Review on Classification, Preparation Methods, Evaluation and its Applications. J Drug Deliv Ther. 2023; 10(5-s):281-289.
[8]. James OM, Victoria IA. Excision and incision wound healing potential of Saba florida (Benth) leaf extract in Rattus novergicus. Inter J Pharm Biomed Res. 2010; 1(4):101-107.
[9]. Moharkar Dw, Lande Ad, Shahare Pd, Mohammad D, Sheikh T, Meshram As. Development And Evaluation Of Aloe-Vera Gel Loaded Crack Cream.
[10]. Nema RK, Rathore KS, Dubey BK, Text Book of Cosmetics: CBS Publishers and Distributors: 2009; 42-43.
[11]. Chandrashekhar B. Badwaik, Updesh B Lade, Tikesh Agarwal, Prachi Barsagade, Madhuri Nandgave, Nilam Gaddamwar: Formulation and Evaluation of Herbal Face Cream , IPJRA, 2022; 7(1): 955-960
[12]. Dr. Singh MP, Panda H: Medicinal herbs with their formulations; vol1; Daya Publishing House, Delhi; 2005; 402-403
[13]. IS 6608:2004; Indian Standard Skin Creams — Specification; Second Revision; bureauof Indian standards;2004; 3
[14]. Aswal A, Kalra M, Rout A, "Preparation and evaluation of polyherbal cosmetic cream"Der Pharmacia Lettre, 2013; 5(1):838.
[15]. Ramachandran R, Saraswathy M. Postconditioning with metformin attenuates apoptotic events in cardiomyoblasts associated with ischemic reperfusion injury. Cardiovascular Therapeutics. 2017 Dec;35(6):e12279