IJNRD.ORG ISSN : 2456-4184
INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD) | IJNRD.ORG
An International Open Access, Peer-reviewed, Refereed Journal

FORMULATION AND CHARACTERIZATION OF CREAM POWDER TINCTURE AND DERMA STICKS OF FICUS GLOMERATA

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ABSTRACT

Human feet maintain the weight of a body, but feet are often neglected. The skin of feet is dry as compared to the skin on the rest of the body because it has no oil glands and it relies on hundreds of thousands of sweat glands to keep the feet moisturized, therefore, feet need special care for protection, beautification, and comfort. Different types of foot care products available in the market are Foot powder, Foot spray, Foot Creams, Corn, and callus Preparation. Foot cream has refreshing, anti-pruritic, deodorizing and antiperspirant, cleansing, an antiseptic and antifungal property which prevents the foot from various ailments like toenail fungus, athlete's foot, bunions, corns, calluses, cracked heels, and pressure. Since the times of Vedas different herbs are used to treat various diseases and for treating skin conditions like czema, dermatitis, etc. F. glomerata is one of the ancient therapeutic hherbswhich has been largely found in India and the whole world to treat diseases. βsitosterol, Gluanol acetate, Dumarin, L,upeol and Lupeol acetate are the active constituents present in Ficus glomerata. These active constituents are responsible for various therapeutic potentials such as anti-inflammatory, antioxidant, antifungal, wound healing, etc. but not much work has been done to evaluate the properties of cosmetic importance. TheThe present study aims explore the properties of cosmetic values such as skin healing and moisturizing property and on e. On eval,uation, it was found product gave satisfactory results.

Keywords: Ficus Glomerata., foot cream, skin healing, subjective Evaluation, antioxidant.

INTRODUCTION

The wound repair process has three orderly but temporally overlaid stages i.e. inflammation, cell proliferation, and tissue regeneration. Wound healing is a process that is fundamentally a connective tissue response. IThe initialstage of this process involves an acute inflammatory phase followed by the synthesis of collagen and other extracellular macromolecules which are later remolded to form scars. Therefore, tissue repair and wound healing the complex processes that involve a series of biochemical and cellular reactions Therseveral reports are statingt the extracts of several plants have wound healing properties Different parts including the latex of Ficus Racemosa. has been used as a medicine for wound healing in the Ayurveda and in the indigenous system of medicine in Sri Lanka. This plant has been evaluated for its wound healing potential using animal models. The aim of this study was to obtain an insight into the wound healing process and identify the potential wound healing active substance/s present in F.Racemosa bark using scratch wound assay (SWA) as the in-vitro assay method.

1.FORMULATION OF CREAM

1.1. Preparation of Foot Cream:

1.2. Selection of foot cream base:

The base selected for foot cream is Stearic acid and Triethanolamine which forms triethanolamine stearate which acts as a base and gives very light textured cream containing suitable emollients which softens the foot

1.3. IDEAL PROPERTIES OF FOOT CREAM:

1. Massage with foot cream should allow relaxation of the feet and hence ready to absorb moisture from the cream.

2. It should soften the cells of the foot.

3. It should stimulate the natural healing process of the skin by hydrating it and regulating the pH balance.

4. The ingredient present in the cream should shield against microbial infections.

5. It should contain the proper dosage of extract in the product.

6. It should stimulate blood circulation, cooling agents as well as providing emolliency and skin softening properties.

7. It should discard all the tensions and treat diseases.

8. It should detoxify feet cells [1].

1.4. Procedure:

Following steps were followed for formulating the foot cream:

Step - 1: Preparation of oil phase: the Oil phase ingredients were weighed and heated in the 250 ml borosilicate beaker at the temperature 80^0 C to form uniform liquid [2].

Step – 2: Preparation of water phase: the water phase ingredients were weighed and heated with continuous stirring in the 250 ml borosilicate beaker at the temperature 80^0 C to form uniform liquid [2].

Step – 3: The Contents of the Oil Phase were mixed in the water phases. Three different concentrations such as 1%, 2%, and 3% of the total extract of F. glomerata extractweres added to cream formulation at 35^0 C during the triturating till the uniform dispersion of the ingredient was achieved. Formulations were allowed to equilibrate for 24 hrs, at room temperature and the prepared creams were filled and stored in the air-tight glass container. The formulation was further evaluated

1.5. CHARACTERIZATION OF F. GLOMERATA CREAM:

Physical parameter:

1. Color: The formulated cream was tested for colour by visual inspection. They were checked against a white background.

2. Odor: The Odour of formulated cream was checked by smelling it.

3. Consistency: The consistency was checked by applyingit on the skin.

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

5.Homogeneity: Developed cream was tested for homogeneity by visual inspection. They were checked for their appearance and presence of any aggregates.

6. Water Wash ability: The formulations were applied on the skin; the ease and extent of washing with water were checked manually.

7.pH determination: Accurately weighed quantity of about 5±0.01g of the cream was taken in a 100ml beaker. 45ml of water was added and the cream was dispersed in it. The pH was determined at 270C using the pH meter [3]

2. FORMULATION OF POWDER

MATERIALS AND METHODS

Fresh ripened fig fruits were purchased from the local market, of Chennai, India. These were used in preparation of custard. DPPH was used for the antioxidant assay. Freeze dried Lactobacillus strain was procured from NCIM-CSIR; National Chemical Laboratory, Pune. MRS broth and MRS agar were used for growing the probiotic. Bile salt, NaCl, and pepsin were used for conducting tolerance tests on probiotics.

PREPARATION OF PREBIOTIC POWDER

Pulp from fresh figs was prepared (without peeling) using a grinder. The pulp was lyophilised (Temperature: -40°C, Pressure: -3mbar) for 30 hr [4]. The freeze-dried pulp was then ground, and the powder so obtained was stored at room temperature (30°C) in sealed aluminium pouches

PHYSICAL PARAMETERS

1.MOISTURE CONTENT AND WATER ACTIVITY

The moisture content was determined using the air oven method (AOAC 2000). The samples were weighed initially and dried in the oven at 105°C. Readings were taken every half hour to determine loss in weight till constant weight is obtained. Final weight is recorded. The moisture content was calculated from the weight difference between the original and dried sample and expressed in percentage. The water activity of the prebiotic powder was calculated using Novasina Lab Swift Water Activity Meter

Moisture Content (wet basis) % = [(Initial Weight-Final Weight)/Initial Weight] x 100

2.COLOR MEASUREMENT

Color value of the prebiotic powder was measured using Colour Quest XE Hunter Colour Meter. The L, a, b chroma system uses the corresponding value of the otcolorour difference (DE) as dynamic parameters, wwhich as useanalyzealyse the dynamic change in the indicator's colour14. The total colour [5] difference (TCD) is expressed as follows:

DE= [(DL) 2 + (Da) 2 + (Db) 2] 1/2

Where,

DL = brightness difference between initiation and each time interval (value should be 0-100)

Da = redness-greenness difference between initiation and each time interval

Db = yellowness–blueness difference between initiation and each time interval

3. BULK DENSITY

The bulk density was measured [6]. 30g weight of powder was poured in to a 100ml measuring cylinder and the volume was recorded. The following formula was used to calculate bulk density:

Bulk Density (LBD) = Mass (g)/Volume (ml)

4. TAPPED DENSITY

The tapped bulk density was measured [6]. 30g weight of powder was poured in to a 100ml measuring cylinder and tapped on a hard surface 30 times from about 2cm height and the volume was recorded. The following formula was used to calculate tapped bulk density:

Tapped Density (TBD) = Mass (g)/Volume (ml)

Carr's Index:

Carr's Index (%) and Hauser's ratio were calculated [6]. The values were determined using the following relationship: C.I. = (TBD – LBD/TBD) x 100

H.R = TBD/LBD

5.SOLUBILITY AND SWELLING CAPACITY

Solubility and swelling capacity was measured [7]. 1 g of the powder was transferred into a clean dried test tube and weighed (W1). The powder was then dispersed in 50 ml of distilled water using a stirrer. The slurry so obtained was heated for 30 min at various temperatures from 60°C. The mixture after cooling to room temperature was centrifuged for 15 min at 3000 rpm. 5 ml of the supernatanwasre dried to a constant weight at 110°C. Solubility was calculated as g per 100 g of powder on a dry weight basis. The residue obtained from the above experiment after centrifugation, with the water it retained was quantitatively transferred to the clean dried test tube used earlier and weighed (W2). The Swelling capacity was calculated by the following formula:

Percentage swelling of starch= [(W2 - W1) / W1] x 100

3. FORMULATION OF TINCTURE

MATERIALS AND METHODS

Plant material The leaves of Ficus Racemosa were collected locally. leaves were dried, powdered and passed through 40 mesh sieve, and kept for further uses

CHEMICALS

All materials used were of analytical reagent grade. Absolute alcohol was obtained from the pharmacy collage laboratory and from that different dilutions were made with distilled water.

METHODS

Twenty-one amber coloured bottles were taken, 200 ml of alcohol of following strengths; 40,50, 60,70,80,90 per cent (v/v) and absolute were poured in separate three sets of seven bottles, each containing specific amount of powdered leaves. Each set of seven bottles were kept for maceration for 7, 14 and 21 days respectively. The materials were filtered through sintered glass crucible (G-4) after maceration. The physical constant values such as colour, pH, specific gravity, solid matter per 100ml were studies, the chemical group tests 8, 9 tin layer chromatographic characteristics were studies [8]. The colours of tinctures prepare were same in the finctures prepared by 7,14 and 21 days of maceration. All the tinctures were clear liquid without any turbidity o sedimentation. Three sets of tinctures were prepared by maceration process utilizing multiples of 10 per cent strengths of dilute alcohol. The products were kept for 7, 14 and 21 days and total solid content for the respective days were studied and noted accordingly.

4.FORMULATION MEDICATED DERMA STICKS

Preparation of medicated derma sticks of Ficus racemosa Medicated derma sticks were prepared by heating and congealing according to the formulae. Depending upon the weight, thickness and length of medicated derma sticks, the formulae was chosen for the incorporation of the drug. Stearyl alcohol / Cetyl alcohol and white petroleum were melted in a china dish and heated this mixture up to 70 °C. Dissolve sodium lauryl sulfate, propylene glycol in purified water and heat the solution to 70 °C separately. Add the oleaginous phase slowly to the aqueous phase, stirring constantly and then the drug was added slowly with continuous stirring in order to get a uniform mixture in optimized formulation. The hot mixture was poured into the glass mould and cooled to get the desired shape of sticks. The stick was removed from the mould after 24 hours with the help of plunger and inserted into the medicated derma stick container [9,10]. Three sticks were selected randomly and weighed individually. The individual weights were compared with the average weight for determination of weight variation. As the shape of the stick is cylindrical the thickness and length were determined with the help of screw gauge and vernier calliper, respectively. The average thickness was measured, by observing thickness at three different parts of the stick.

4.1. ANTIMICROBIAL STUDIES OF FORMULATIONS

The antimicrobial activity of prepared formulation evaluated against bacterial and fungal strains by using agar well diffusion method. Nutrient agar plates were prepared for all extracts, 50µl inoculums of each selected bacterium (S. aureus, E. coli and C. albicans) was uniformly spreaded on agar plates with the help of glass spreader, after five minutes three wells approximately 5mm diameter was bored with the help of borer. The plant extract were poured into the wells. The plates were incubated at 37 °C for 24 hrs. Petri plates containing 20 ml of agar medium were seeded with a 24 hour culture of the bacterial strains. In each plate, hole of 6-mm diameter was made using a sterile borer. The sample solution at concentration (100 µg/ml) was poured into hole of the inoculated agar. The inoculums size was adjusted so as to deliver a final inoculum of approximately 108 colony-forming units (CFU)/ml. Incubation was performed for bacteria and fungus at 37 ºC for 24 hrs and 37 ºC for 72 hrs respectively.[11,12]

The assessment of antibacterial activity was based on measurement of the diameter of the inhibition zone formed around the well. A standard gentamycin and fluconazole were used as a positive control. All assays were carried out in triplicate.

Table 1: Pharmacological activity reported in Ficus Racemosa.[27-52]

S. No.	Part of plant	Pharmacological activity	Reported by
1.	Leaves	Antibacterial Activity	Mandal SC et al 2000
2.	Barks and Leaves	Analgesic activity	Malairajan P et al 2006
3.	Leaves	Anti-inflammatory Activity	Mandal SC et al 2000
4.	Stem Bark	Antipyretic activity	Rao RB et al 2002
5.	Stem Bark	Anti-tussive activity	Bhaskara RR et al 2003
6.	Leaves	Hypotensive activity	Trivedi CP et al 1969
7.	Fruit	Anti-filarial activity	Mishra Vet al 2005
8.	Leaves, Bark,Fruit	Radio Protective /Antioxidant Activity	Veerapur VP et al 2009 Channabasavaraj KP et al 2009 Jahan IA et al 2008
9.	Stem Bark	Angiotensin Converting Enzyme Inhibitor Activity	Ahmed F et al 2010
10.	Stem Bark	Cardioprotective Activity	Ahmed F et al 2012
11.	Tannin's	Diabetic Complications	Velayutham R et al 2012
12.	Stem Bark	Hepatoprotective Activity	Ahmed F et al 2010
13.	Stem Bark	Memory Enhancing Activity	Ahmed F et al 2011
14.	Stem Bark	Protective Renal Oxidative Injury	Khan N et al 2005
15.	Fruit	Anti-filaria Activity	Mishra V et al 2005
16.	Stem Bark	Anthelmintic Activity	Chandrashekhar CH et al 2008
17.	Leaves, Bark,	Wound Healing Activity	Biswas TK et al 2003
18.	Stem Bark	Renal anticarcinogenic	Khan N et al 2005
19.	Stem Bark	Larvicidal Activity	Bhatt RM et al 1984
20.	Stem Bark	Anti-diarrhoeal Activity	Mukherjee PK et al 1998
21.	Stem Bark	Antidiuretic Activity	Ratnasooriya WD et al 2003
22.	Stem Bark	Antinociceptive Activity	Ferdous M et al 2008
23.	Stem Bark	Anti-Parkinson Activity	Jitendra O et al 2016
24.	Fruit	Cytotoxic and Anticancer Activity	Dnyaneshwar S et al 2016
25.	Stem Bark	Platelet Aggregation Inducing Activity	Faiyaz Ahmed et al 2012

5.WOUND HEALING ACTIVITY

Ethanol extract of Ficus Racemosa stem bark showed wound healing in excised and incised wound model in rats.[13]

5.1. ANIMALS

Wistar albino rats of either sex weighing between (180-200 g) were obtained from Jai Foundation Research, Vapi (Gujarat). The study was approved by the Institutional Ethics Committee for animal experimentation, Vidyabharti Trust College of Pharmacy, Umrakh, Gujarat all the procedures on animals were carried out as per CPCSEA guidelines, India. These animals were used for the wound healing activity studies. The animals were stabilized for 1 week. They were maintained in standard conditions at room temperature, (60 5)% relative humidity and 12 Hrs light dark cycle. They were given standard pellet diet and water ad libitum throughout the course of the study. The ethanolic and aqueous extracts of F. recemosa were administered topically to all groups of animals.

5.2, INCISION WOUND MODEL

The rats were anesthetized by administering ketamine (0.5 mL/kg b.w. i.p.). Incision wounds of about 6 cm in length and 2 mm in depth were made with sterile scalpel on the shaved back of the rats 30 min after the administration of ketamine injection. The parted skin was kept together and stitched with black silk at 0.5 cm intervals. Surgical thread (no. 000) and a curved needle (no. 9) were used for stitching. The continuous thread on both wound edges was tightened for good closure of the wounds.The wounds of animals in the different groups were treated with drug topically for a period of 10 days. Rats were divided into four groups with 6 in each group. Rats in group 1 were topically treated with simple ointment and served as control; rats in group 2 were topically treated with povidone lodine ointment; and rats in group 3 and 4 were topically treated with aqueous and ethanolic extract of F. racemosa, respectively. The wounding day was considered as day 0. When wounds were cured thoroughly, the sutures were removed on the 8 th post-wounding day and the tensile strength of the skin that is the weight in grams required to break open the wound/skin was measured by tensiometer on the 10 th day [14-18]

5.3. EXCISION WOUND MODEL

A standard wound of uniform 2 cm diameter was formed with the aid of a round seal [19-22]. The treatment to the excision wounds of the rats was the same as described above. The percentage wound closure, epithelization time and scar area on complete epithelization were measured

5.4. HISTOPATHOLOGICAL EXAMINATIONS

Specimen samples of skin tissues from control, standard and treated groups were taken out from the healed wounds of the animals in excision and incision wound models for histopathological examinations. The thin sections were cut and stained with haematoxylin and eosin [23-25] and observed under microscope for the histopathological changes such as fibroblast proliferation, collagen formation

6.ANTIOXIDANT ACTIVITY BY DPPH METHOD

A spectrophotometric assay was performed to determine the antioxidant property in the extract using the stable radical, DPPH as a reagent. Because of the delocalization of the spare electron over the entire molecule, DPPH acts as a stable free radical, and the molecules do not dimerize, as most other free radicals. DPPH solution possesses purple color, characterized by absorption at 520 nm. The hydrogen atom or electron-donating abilities of the compounds and some untainted compounds can be measured from the bleaching of the purple-colored ethanol solution of DPPH [26]. The antioxidant properties of the extract were assayed with standard solutions of ascorbic acid. Solution of plant extract was made in ethanol and 0.3 mM solution of DPPH was made in 100% ethanol. DPPH and ethanolic solution of extract were mixed in a 1:3 ratio. A control reaction mixture was made with DPPH and blank ethanol solvent but with standard phosphate buffer solution. After allowing the reaction to continue for 30 min, their absorbance was observed at 517 nm to determine the % scavenging activity at different concentrations

$$\text{Calculation of \% inhibition} = \frac{\text{Control absorbance - Test absorbance}}{\text{Control absorbance}} \times 100$$

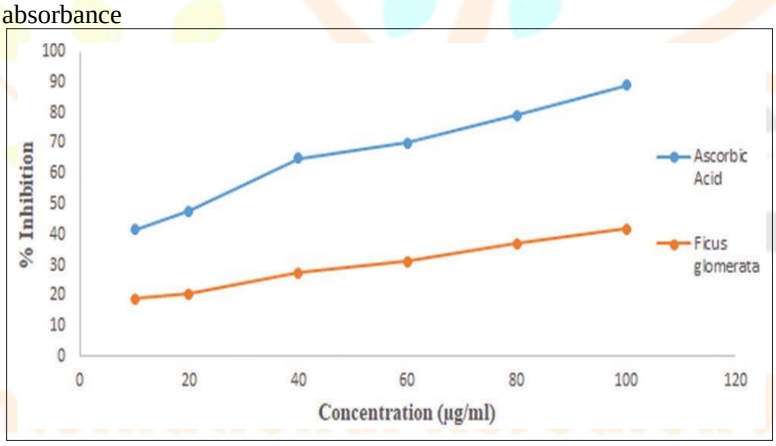

Fig.: Antioxidant estimation by DPPH of **Ficus Glomerata**

CONCLUSION

Tribal and rural socities have discovered solution for their needs, problem and treatment of disease from natural resources. The Ficus racemosa. having varous important pharmacological activity which is discussed in a current review. This is signifying that it is the most vital plant for human civilization and require more concentration for formulation development. F. glomerata stem extract also possesses Antioxidant properties obtained from extracts can be a promising alternative toward the use of synthetic oxidants and could help in avoiding the side effects that occur due to the use of synthetic antioxidants Wound Healing Activities; formulation herbal foot cream which overcomes the lacunae of available chemical-based foot cream formulations. Statistically significant beneficial effect was observed with foot treatment in the parameters like cracked heels, dryness of soles and moisturizing effect. There were no adverse effects; therefore, it can be incorporated in skin cream Tincture Powder and Derma sticks to formulation and evaluate its anti-aging property

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