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A HERBAL APPROACH TO WOUND HEALING: FORMULATION AND EVALUATION OF FICUS RACEMOSA-BASED TOPICAL OINTMENT

Miss. Rohini Raktate[1*], Mr. Avinash Hatkar[2], Miss. Sakshi Jaju[3], Dr. Sunil Jaybhaye[4]

[1]*Student of institute of pharmacy, Badnapur, Jalna.*
[2]*Department of Pharmacology, Faculty of Institute of Pharmacy Badnapur.*
[3]*Department of Pharmaceutics, Faculty of Institute of Pharmacy Badnapur.*
[4]*Principal of institute of pharmacy, Badnapur, Jalna.*

ABSTRACT

The present study focuses on the formulation and evaluation of a herbal ointment using Ficus racemosa extract for wound healing applications. Wound healing is a complex physiological process that can be hindered by infections, poor nutrition, and immune-compromised conditions. Synthetic treatments, although effective, often have side effects such as allergic reactions or delayed healing. Herbal remedies offer a safer and more natural alternative. In this work, Ficus racemosa leaves were extracted using ethanol through maceration and incorporated into an ointment base consisting of wool fat, Cetostearyl alcohol, hard paraffin, and soft paraffin. The formulation was prepared using the levigation method. The prepared ointment underwent various evaluation tests including pH, spreadability, washability, viscosity, solubility, and skin irritancy. Results showed that the ointment was stable, non-irritant, and had suitable physical characteristics for topical application. Ficus racemosa demonstrated potential antimicrobial and antioxidant properties, indicating its effectiveness in wound healing. This study supports the use of herbal formulations as a viable alternative to synthetic drugs in treating skin infections and wounds.

KEYWORDS: *Ficus racemosa, Herbal ointment, Wound healing, Antimicrobial, Phytochemicals, Maceration, Natural medicine, Ointment evaluation*

1.INTRODUCTION

Wounds are clinical entities which are common in day-to-day life. Wound may be defined as a break in the continuity of the living tissue to an injury. Wounds cause discomfort and more prone to infection and other troublesome complications. Some diseases like immune compromised conditions, ischemia and conditions like malnutrition, ageing, local infection and local tissue damage which leads to delaying of wound healing. Wound healing is an intricate process where the skin repair itself after injury. Wound healing is divided into three phases like inflammatory, proliferative and remodeling phase. Inflammatory phase is characterized by increased blood flow, increased capillary permeability and increased migration of leucocyte in the affected area. The proliferative phase is characterized by granulation, contraction and epithelization. Remodeling phase determines the strength and appearance of the healed area. A wide range of therapies for promoting wound healing have been suggested, which include antimicrobial agents, cyanoacrylate adhesives, corticosteroids, phototherapy with low power lasers and other anti-inflammatory, immunosuppressive and immune modulatory agents. They all commonly have a problem by causing severe side effects which include allergic reaction, scar formation etc. Even some of the drugs may delay the healing time due to the inhibition of collagen synthesis, epithelization etc. Hence the need of the hour is to develop the new drugs without side effects.

In this scenario, herbal medicine still holds their unique place in the way of having without side effects. A large number of herbal products are equally used by tribals and folklore traditions in India for treatment of cuts, wounds, and burns. The chemical entities derived from plants need to be identified and formulated for the treatment and management of wounds. In this direction a number of plant drugs are being investigated at present. Many plant drugs have been used in management and treatment of wounds over the years. Plants and their extracts have immense potential in the management and treatment of wounds[3].

Ointment: Ointment is semisolid preparation use for topical application to the skin or mucous membrane. It topically consists of a combination of medicinal substance dissolved or dispersed in suitable base[2].

2.OBJECTIVE

1. Enhancing wound healing process
2. Providing antimicrobial and antioxidant benefits

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3. Ensuring skin compatibility and safety

Characteristics
1. It must be chemically and physically stable.
2. Ointment ingredients shouldn't have any pharmacological effects.
3. The cream shouldn't be gritty or uncomfortable to apply[7]

Advantages
1. Appropriate for patients who are unconscious and are trouble taking.
2. They bypass first pass metabolism.
3. They are the right dosage form for unappealing medications.
4. They are easier to use and more chemically enduring than liquid dosage forms.

Disadvantages
1. Ointment applied with a fingertip may become contaminated, which could irritate the skin during

Application
1. They are also more difficult to handle than solid dosage forms because they are semisolids.
2. Semisolid preparations physically and chemically show less stability as compared to solid dosage forms[3].

3. NEED OF WORK
1. Extraction and standardization of Ficus racemosa extract
2. Formulation development (ointment base, concentration, etc.)
3. Physicochemical evaluation (pH, viscosity, spreadability, etc.)
4. Stability studies (temperature, humidity, light exposure)
5. In vitro and in vivo wound healing studies
6. Skin irritation and toxicity studies
7. Microbiological testing (sterility, antimicrobial activity)
8. Quality control and assurance

These steps ensure the development of a safe, effective, and stable ointment formulation using Ficus racemosa for wound healing applications.

4. DRUG PROFILE & EXCIPIENT PROFILE
Ficus racemosa
Synonym: Ficus racemosa, gula
Family: Moraceae
Biological Source: Native to Australia & tropical Asia
Chemical constituent: Sterols, tannins and flavonoids, triterpenoids (Lanosterol) and alkaloids.



Fig. 1 Ficus Racemosa Leaf

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Throughout history, medicinal herbs have been extensively relied upon by civilizations as a fundamental source of healing. Ancient texts like the Vedas and the Bible highlight the use of herbal remedies for healthcare, showcasing the natural medicinal properties of conventional herbs and plants.

1. The utilization of medicinal plants in many developing countries as a primary source of maintaining good health is significant
2. Moreover, the reliance on medicinal shops in industrialized societies has led to the development of various drugs and chemotherapeutics sourced from these plants
3. The World Health Organization found that 80% of the global population uses herbal medicine for their healthcare needs
4. Ficus, consisting of 750 species of woody plants in tropical and semi-tropical regions, stands out for its delicious taste and therapeutic benefits due to its biologically active phytochemical components.
5. F racemosa Linn., an evergreen tree with unique characteristics, possesses pharmacological significance across all its parts. Traditionally, its leaves, fruits, bark, latex, and root sap have been used to treat various conditions like piles, dysentery, and asthma. Scientific studies have explored their diverse medicinal properties such as hepatoprotective, chemoprotective, antidiabetic, antipyretic, antitussive, and antidiuretic effects.
6. These medicinal attributes are often attributed to the plant's antioxidant properties, which are known to be beneficial for various health conditions. Moreover, the plant has been found to contain phytochemical compounds like sterols, tannins, and flavonoids that offer protection against different pathogens.
7. The presence of compounds like beta-sitosterol in F race Mosa's fruit extracts has shown potential anti-diabetic properties. Additionally, flavonoids, powerful antioxidants, interact with enzymes in the body, showcasing their ability to modulate enzyme activity effectively[3].

Morphology

Goolar is an attractive fig tree with a crooked trumk and a spreading crown. Unlike the banyan, it has no aerial roots. The most distinctive aspect of this tree is the red, furry figs in short clusters, which grow directly out of the trunk of the tree.

Those looking for the flower of goolar should know that the fig is actually a compartment carrying hundreds of flowers Fig trees have a unique form of fertilization, each species relying on a single, highly specialized species of wasp that is itself totaly dependent upon that fig species in order to breed. The trees produce three types of flowers; male, a long-styled female and a short-styled female flower, often called the gall flower.

All three types of flowers are contained within the structure we usually think of as the fruit. The female fig wasp enters a fig and lays its eggs on the short styled female flowers while pollinating the long styled female flowers. Wingless male fig wasps emerge first, inseminate the emerging females and then bore exit tunnels out of the fig for the winged females.

Females emerge, collect pollen from the male flowers and fly off in search of figs whose female flowers are receptive. In order to support a population of its pollinator, individuals of a Ficus spp. Must flower asynchronously. A population must exceed a critical minimum size to ensure that at any time of the year at least some plants have overlap of emission and reception of fig wasps. Without this temporal overlap the short-lived pollinator wasps will go locally extinct Leaves: The leaves are dark green, 6-10 cm long, glabrous; receptacles small subglobose or piriform, in large clusters from old nodes of main trunk[13].

Table no. 1 Taxonomic position of F. racemosa

Kingdom	Plantae
Division	Magnoliophyte
Class	Magnoliopsida
Order	Urticales
Family	Moraceae
Genus	Ficus
Species	Racemosa

5. MATERIALS AND METHODS

Collection of Plant Material

First, we identified and collect the plant leaves of from the different localities of vathar and its nearby areas and washed them thoroughly with distilled water. The cleaned plant leave are then allowed for the complete shade drying and then made to a fine powder with a mechanical grindand stored in an air-tight container.and herbal plant

Maceration Method

The extract was obtained by the maceration process. 50gm powder was imbibed with 500ml of 90% ethanol for maceration for 7

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days with stirring. finally ethanolic extract was collected and concentrate to get blackish residue. extract was stored in the airtight container at cool and dark place.



Fig. no. 2



Fig. no. 3

Experimental Work

Table no. 2 Formulation table

Materials	Role
Wool fat	Emollient
Cetostearyl alcohol	Emulsifier and stabilizer
Hard paraffine	Consistency enhancer
Soft paraffin	Moisturizer, prevent dryness
Extract	Wound healing

Procedure

Procedure for Preparation of herbal Ointment

a) Initially prepare the ointment base by weighing accurately grated hard paraffin which is to be place in evaporating dish on water bath. After melting of hard paraffin add remaining ingredients and stir gently to aid melting and mixing homogeneously followed by cooling of ointment base.

b) Prepare the herbal ointment by mixing accurately ficus racemosa leaf extract to the ointment base by levitation method to prepare a smooth paste with 2 or 3 times its weight of base, gradually incorporating more base until to form homogeneous ointment, finally transferred in a suitable container[2].

6. EVOLUTION TEST

1) Spreadability test

Excess sample was placed between the two glass slides and 100 g weight was placed on the glass slide for 5 min to compress the sample to a uniform thickness. Weight (100 g) was added to the pan. The time in seconds required to separate the two slides was taken as a measure of spreadability.

Spreadability = 100gm

2.5cm/5. Spreadability was calculated by following

formula

$S = M \times L / T$

Were

S= Spreadability

M= Weight tide to upper side

L= Length of glass slides

T= Time taken to separate the slides

It was found to 5 seconds.

2) Washability Test

Washability was determined by rubbing the little amount

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of base on hand for test.

3) Irritancy Test

Small quantity of ointment applied on skin and wait for 10 minutes after 10 minutes we evaluate that ointment properties on skin.

4) Identification test Ointment

a. Color b. Oduor c. Consistency

5) Test of solubility

The contents should be soluble in 9 parts of water and in 1.7 parts of hot water. The contents should be miscible with alcohol, ether and chloroform.

6) Viscosity

Viscosity of ointment was measured by the Brookfield viscometer. The correct spindle was selected (spindle no)
4) for the given product then the operating condition was setup. Then the viscosity was measured directly at 6rpm speed by keeping the torque constant. The mean was obtained.
The viscosity is determined by following
formula: Viscosity
= Dial Reading × Factor, For. I.V-4 at 6 RPM Factor is 1M (1000)
Identification test of pH
To find out the pH of ficus racemosa indicum ointment, in practical bases, the electrode can dip in the solution of Dyerophytum. The solution was prepared by One gram of the weighed formulation was dispersed in 100 mL of diluted tween 80 (polysorbate 80).

7) Rancidity

This test is performed by using the Phloroglucinol solution. The rancidity is due to the oxidation of the fats and oils; during oxidation free fatty ulster shown acids are liberated. These free fatty acids react with the Phloroglucinol solution and gives pink color. This indicates the rancidity of the product.10 ml of melted ointment was taken then added 10 ml of concentrated hydrochloric acid and 10 ml of Phloroglucinol solution and shaken for one minute. The material shall be taken to have passed the test if no pink color developed.

8) Identification test of pH

To find out the pH of ficus racemosa ointment, in practical bases, the electrode can dip in the solution of ficus racemose. The solution was prepared by One gram of the weighed formulation was dispersed in 100 mL of diluted tween 80 (polysorbate 80).

RESULT AND DISCUSSION

The present study was done to prepare and evaluate the herbal ointment. For this the herbal extracts were prepared by using simple maceration process to obtain a good yield of extract and there was no any harm to the chemical constituents and their activity.
The levigation method was used to prepare ointment so that uniform mixing of the herbal extract with the ointment base was occurred which was stable during the storage.

Table no. 3 observation table

Sr. no.	Ingredient	Std. formula	Working formula	F1	F2	F3	F4
1	Wool fat	100gm	3gm	3gm	3gm	3gm	3gm
2	Cetostearyl alcohol	100gm	3gm	3gm	3gm	3gm	3gm
3	Hard paraffine	100gm	3gm	3gm	3gm	3gm	3gm
4	Soft paraffin	600gm	18gm	17.9gm	18.1gm	18.5gm	17.8gm
5	Extract	100gm	3gm	3gm	3gm	3gm	3gm

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F1 F2 F3 F4

Fig.no.4 Formulation Batches

Table no. 4

Evolution Parameter	Observation	
	F1	F2
Color	Light Green	Green
Oduor	Slightly Sweet	Slightly Sweet
Consistency	Viscous	Viscous
Ph	6.6	6.10
Spread ability	48mm	50mm
Solubility	Soluble in chloroform	Soluble in chloroform
	Insoluble in water	Insoluble in water
Washability	Slightly washable and sticky	Slightly washable and sticky
Non irritancy	Non irritancy	Non irritancy
Viscosity	41cps	37cps

CONCLUSION

From the study it can be conduct that prepare ointment using ficus racemosa is suitable for treat or prevent skin infection and so better alternative other than allopathic ointment. Hence reduce the side effect and skin dryness of human skin. ficus racemosa has good antimicrobial properties and uses for the treatment of skin infection cause by susceptible organism.

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