



Formulation and Evaluation of Medicated Derma Sticks of *Ficus racemosa* For Management of Infectious Skin Diseases

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Abstract

External infections involving the skin are the most frequent complications affecting humans and animals. Medicinal plants play great roles in the treatment of infectious skin diseases. The present study was aimed to formulate and evaluate medicated sticks of *Ficus racemosa* extract. The petroleum ether and ethanol (70%) extracts were prepared. Medicated derma sticks of *Ficus racemosa* extract were prepared by heating and congealing and evaluated for thickness, length and weight. The findings of weight, thickness and length of medicated derma sticks of *Ficus racemosa* were found to 2.3±0.18 gm, 5.9±0.32 mm and 3.8±0.11 cm, respectively. The medicated derma sticks of *Ficus racemosa* were evaluated for antimicrobial activity against *S. aureus*, *E. coli* and *C. albicans*, and further stability studies was performed. The zones of inhibition of medicated derma sticks of *Ficus racemosa* against *S. aureus*, *E. coli* and *C. albicans* were 20.17±0.31, 18.24±0.82 and 29.12±0.65 mm, respectively. The values of zones of inhibition were near to value of pure drug. The stability study of medicated derma sticks of *Ficus racemosa* exhibited that the formulations were safe to use.

1 Introduction

Infectious skin disease in human is caused by many species of bacteria and fungi, prevailing as a major public and health issue globally. Topical lotions / shampoos / ointments or antifungal drugs available to treat skin diseases mostly do not respond or have the tendency to relapse or reoccur and cause many side effects. Highly effective drugs are available to cure the disease but are unaffordable. To eliminate this problem an alternative therapy as antimicrobial activity is needed.

Therapeutic efficacy of many indigenous plants for several disorders has been in use from the past. Herbal medicine is becoming increasing because of its effective curability, availability, affordability and less or nil side effects. Plant derived antibacterial and antifungal drugs could provide a niche for herbal formulations against skin disease in human with possible better affordability and curability¹.

Ficus racemosa (Moraceae) is a popular medicinal plant in India, which has long been used in Ayurveda, the ancient system of Indian medicine, bark, leaves and unripe fruits etc.

are used externally and internally to cure many diseases. Phytochemical investigated on *F. glomerata* have reported the presence of cycloartenol, euphorbol, hexacosanate, triacetate, taraxerone, tetratriterpene, glauanolacetate, racemosic acid, glauanol, glucose, hentriacontane. Root is used in dysentery, pectoral complaints, and diabetes, applied in mumps, other inflammatory glandular enlargements and hydrophobia. The bark is highly efficacious in threatened abortion and also recommended in urological disorders, diabetes, hiccough, leprosy, skin diseases, asthma and piles. The leaves are good wash for wounds and ulcers^{2,3}.

The numerous patients are not comfortable in application of ointments and lotion for the treatment of skin diseases. Hence medicated derma sticks are best option over ointment and advantage of these sticks comprises patient compliance; convenience and comfort for efficient treatment include application without fingertip, immediate onset of action, reduced dosage regimen and economy⁴. Therefore in the present study we planned to develop medicated derma sticks of *Ficus*

racemosa extract by heating and congealing method for dermatitis.

2 Materials and Methods

2.1 Plant material

The leaves of *Ficus racemosa* were collected from outskirts of Gulbarga, Karnataka, India. Further, it was identified by the taxonomist. The leaves were shade dried, reduced to coarse powder and stored in airtight container till further use.

2.2 Preparation of extract

The powdered leaves of *Ficus racemosa* about 250 gm were packed in Soxhlet apparatus and extracted with petroleum ether and ethanol (70%) separately, until the completion of the extraction. The extract was filtered while hot, and the resultant extract was distilled in vacuum under reduced pressure in order to remove the solvent completely, and later dried in a desiccator.

2.3 Preparation of medicated derma sticks of *Ficus racemosa*

Medicated derma sticks were prepared by heating and congealing according to the formulae (Table 1). 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^{5,6}.

Table 1: Composition of medicated derma sticks of *Ficus racemosa*

Ingredients	Quantity (gm)
<i>Ficus racemosa</i> Extract	1.00
Stearyl alcohol	15.00
White petrolatum	20.00
White Beeswax	5.00
Sodium lauryl sulfate	1.50
Propylene glycol	12.50
Purified water (Q.S.)	100.00

2.4 Evaluation of prepared medicated derma sticks

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 was determined with the help of screw gauge and vernier calipers, respectively. The average thickness was measured, by observing thickness at three different parts of the stick.

2.5 Antimicrobial studies of prepared 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 inoculum 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 hours 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 inoculum 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 °C for 24 hrs and 37 °C for 72 hrs respectively⁷⁻⁹.

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.

2.5 Stability studies

Stability studies for the formulations were carried out by storing at 27±2 °C for a period of three months. At intervals of one month the sticks were visually examined for any physical changes.

3 Results and Discussions

The skin is the outermost and first line of defense of human body. The skin is easily exposed to physical agents and different pathogens leading to various infections and skin diseases¹⁰. Infectious skin diseases pose considerable treatment challenges, especially given the recent appearance of several highly virulent pathogens as well as the rising number of immunocompromised patients. Common priorities for all infectious skin disease categories include increased disease surveillance, study of existing treatments, and efforts in drug development¹¹. The literature of *Ficus racemosa* exhibited therapeutic properties of diabetes, hiccup, leprosy, skin diseases, asthma and piles.

Thus the antimicrobial activity of medicated derma sticks of *Ficus racemosa* against pathogenic microbes was evaluated.

Steryl alcohol and Cetyl alcohol as stiffening agent while petrolatum used as emollient, propylene glycol and sodium lauryl sulphate were used as humectants and emulsifying agent respectively. A total of six formulations were designed. As the material was uniformly filled in mould with uniform Medicated sticks of *Ficus racemosa* were prepared by heating and congealing method.

The prepared medicated derma sticks of *Ficus racemosa* obtained were of uniform length, thickness and weight respectively (Table 2). The findings of weight, thickness and length of medicated derma sticks of *Ficus racemosa* were found to 2.3±0.18 gm, 5.9±0.32 mm and 3.8±0.11 cm, respectively.

Table 2: Data of weight, thickness and length of medicated derma sticks of *Ficus racemosa*

Medicated sticks	Weight (gm)	Thickness (mm)	Length (cm)
<i>Ficus racemosa</i> Extract	2.3±0.18	5.9±0.32	3.8±0.11

All values are in triplicate and expressed in mean±SD

The present investigation shows the efficacy of medicated derma sticks of *Ficus racemosa* against the selected pathogenic microbes (Table 3). Antimicrobial activity of medicated derma sticks of *Ficus racemosa* were investigated against *S. aureus*, *E. coli*, and *C. albicans*. The zones of inhibition of medicated derma sticks of *Ficus racemosa* against all the microorganisms are displayed in table 3. The zones of inhibition of medicated derma sticks of *Ficus racemosa* against *S. aureus*, *E. coli* and *C. albicans* were 20.17±0.31, 18.24±0.82 and 29.12±0.65 mm, respectively.

The stability study of medicated derma sticks of *Ficus racemosa* exhibited that the formulations were safe to use in tropical application (Table 4).

Table 3: Antimicrobial studies of medicated derma sticks of *Ficus racemosa* showing the comparative zone of inhibition with pure drug

Formulation	Zone inhibition (mm)		
	<i>S. aureus</i>	<i>E. coli</i>	<i>C. albicans</i>
Sticks of <i>Ficus racemosa</i>	20.17±0.31	18.24±0.82	29.12±0.65
Gentamycin	23.15±0.82	20.36±0.61	--
Fluconazole	--	--	29.43±0.35

All values are in triplicate and expressed in mean±SD

Table 4: Stability studies of medicated derma sticks of *Ficus racemosa*

Duration	Temperature	Physical appearance	pH
After 1 month	27±2 °C	No change	7.2±0.14
After 2 month	27±2 °C	No change	6.8±0.63
After 3 month	27±2 °C	No change	6.7±0.48

4 Conclusion

The medicated derma sticks of *Ficus racemosa* were prepared and evaluated for antimicrobial activity. From the findings it has been concluded that the prepared medicated stick can be used as a tropical application for the healing of infectious skin diseases.

5 Conflict of interests

None

6 Authors contributions

MGKM and KPR carried out research work and drafted the manuscript.

7 References

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