



FORMULATION, DEVELOPMENT AND EVALUATION OF FOOT CREAM WITH *FICUS RELIGIOSA*

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ABSTRACT

Feet are the important organ of human body but they are often neglected. Feet need to be taken care for comfort, beautification and protection from various microorganisms. The objective of present work is to formulate and develop foot cream with *ficus religiosa* as antimicrobial agent. It is reported that *Ficus religiosa* bark is having antimicrobial activity, hence aqueous extract of bark was incorporated in foot cream and was evaluated for its antimicrobial activity. It was concluded that the product is good in terms of antimicrobial activity.

Key words: - *Ficus religiosa* extract, foot cream, antimicrobial activity

INTRODUCTION

Feet are the important organ of human body and are exposed to a lot of friction and external environment [1]. The lack of oil glands on the sole of the foot predisposes it to dry skin. Neglectance towards feet can lead to different disorders generally due to improper footwear, and one can suffer from infections because of the external penetration of dirt, fungi, bacteria through these cuts and wounds. It is reported that bacterial decomposition gives rise to foot odors, in which bacteria *Staphylococcus epidermidis* is responsible[2]. Also skin's resident microorganisms are responsible sometimes for foot disorders such as *Candida albicans*, *Escherichia coli*, and *Staphylococcus aureus*.

Ficus religiosa is commonly known as peepal tree. The bark is grey colored. It is reported that bark contains 4% tannins, alkaloids, minerals, and certain vitamins. The bark is astringent, sweet, cooling and aqueous extract of it is known to have antibacterial activity. The bark is helpful in curing inflammatory swellings, burns of skin, improving skin texture [3].

Hence, in this study attempt have made to formulate and develop a foot cream using *Ficus religiosa* bark extract as antimicrobial agent.

MATERIALS AND METHODS

Collection and authentication of plant material

The bark was collected and authenticated from the Department of Botany, Rashtrasant Tukdoji Maharaj Nagpur University, Nagpur and authentication number is 9249.

Extraction

Bark sample of *Ficus religiosa* plant was immersed in water, mixed and allowed to soak

for 24 hours. The mixture was then filtered through whatman no. 4 filter paper. The filtrate was then evaporated to obtain crude extract [4].

Qualitative and Phytochemical screening of Extract:-

The *Ficus religiosa* bark extract was checked for its qualitative properties such as color, odour, & pH. The results are shown in following table 1.

Table 1: Qualitative Analysis of aqueous Extract of Bark

Sr. No.	Test	Results
1	pH	6.90
2	Colour	Pale yellow
3	Odour	Characteristic

The *Ficus religiosa* bark extract was subjected to preliminary phytochemical screening for the detection of various plant constituents [5]. The results showed the presence of tannins and flavonoids.

Evaluation of antimicrobial activity of plant extract:-

For screening the dilution of extract was prepared. For this 0.2 gm of extract was weighed and to this 0.8 ml of sterile distilled water was added. For blank sterile distilled water was used as control. *Ficus religiosa* bark extract was observed for antimicrobial activity against *E. coli*, *S. aureus*, *S. epidermidis*, *C. albicans*, by using well plate method, for studying the zone of inhibition[6]. The cultures of above mentioned microorganisms were procured from Rajiv Gandhi Institute, Rashtrasant Tukdoji Maharaj Nagpur University, Nagpur and were sub cultured and grown in suitable growth medium. By using sterile cork borer wells were bored on solidified agar plates of different microorganisms. The

wells were filled with prepared extract by sterile pipettes, the plates were then incubated (for *S. aureus*, *E. coli*, *S. epidermidis* at 37°C for 24 hours and for *C. albicans* at 37°C for 48 hours).The activity of extract was indicated by a clear zone of inhibition around the wells, these zones of inhibition were measured and recorded. The results are summarized in table 2.

Table 2 – Evaluation of antimicrobial activity of *Ficus religiosa* bark extract

S. N.	Name of Microorganism	<i>Ficus religiosa</i> aq. extract	Sterile Distilled water
1.	<i>Escherichia coli</i> ,	22 mm	-
2.	<i>Staphylococcus aureus</i>	23 mm	-
3.	<i>Staphylococcus epidermidis</i>	21 mm	-
4.	<i>Candida albicans</i>	20 mm	-

Diameter of cork borer used 10 mm ; ‘-’ indicates no Zone of Inhibition

Formulation of Foot-Cream with *Ficus religiosa* bark extract

An oil in water emulsion cream base was formulated and different concentrations of extracts were incorporated as per given in formulation table3.

Table -3 Formulation Table of Foot Cream

S. N. o	Ingredients	Base (Control)	Base with active(<i>Ficus religiosa</i> bark extract)		
			3%	5%	7%
	OIL PHASE				
1.	Stearic Acid	4	4	4	4
2.	Cetyl alcohol	1.4	1.4	1.4	1.4
3.	Bees wax	3	3	3	3
4.	Mineral Oil	6	6	6	6
	WATER PHASE				
5.	Triethanolamine	1	1	1	1
6.	Glycerin	5	5	5	5
7.	Propylene Glycol	6	6	6	6
8.	Water	73.3	70.3	68.3	66.3
9.	ACTIVE PHASE <i>Ficus religiosa</i> bark extract	-	3	5	7

Analysis of Finished Product as per Indian Standard

All the creams containing 3%, 5%, and 7% *Ficus religiosa* bark aqueous extract were subjected to analysis as per the specification

given in IS. No. 6608-2004 for skin cream [7]. The results are summarized in table 4.

Table 4 -Analysis of Cream Formulations

S. N.	Parameter	BIS Specifications	Results		
			3% extract	5% extract	7% extract
1.	pH	4 to 9	6.15	6.20	6.24
2.	Thermal stability	To pass the Test	Passed	Passed	Passed
3.	TFM	Minimum 5	10.04	10.02	10.01

Antimicrobial analysis of foot product:-

For screening 0.9gm of foot cream was weighed to this 0.1gm of sterile Isopropylmyristate was added to prepare dilution.

0.5ml of cream dilution was aseptically transferred in the wells on petri dishes containing different experimental microorganisms on suitable growth medium. The plates were then incubated as per the time period and temperature mentioned. The activity of cream sample was indicated by a clear zone of inhibition around the wells. These zones of inhibitions were measured and recorded. The results are summarized in following table 5.

Table -5 Zone of Inhibition of formulation

S. N.	Microorganism	Cream Formulations		
		3% extract	5% extract	7% extract
1.	<i>Escherichia coli</i>	17	18	20
2.	<i>Staphylococcus aureus</i>	16	19	22
3.	<i>Staphylococcus epidermidis</i>	18	18	21
4.	<i>Candida albicans</i>	18	18	19

Diameter of Cork borer used – 10mm

Subjective Evaluation

From above observation it was decided to use cream containing 7% concentration of *Ficus religiosa* bark aqueous extract for subjective evaluation as it showed highest zones of inhibitions.

Foot cream was given to 20 subjects to use for 1 month to carry out the subjective evaluation. These subjects were asked to use the cream daily for 30 days and note down the changes before and after the use of foot cream. They were asked to evaluate the product on the basis of parameters like appearance of the product, spreadability of cream, antibacterial effect on feet and in between the fingers and

irritancy. They were asked to rate the product on its overall performance, the data was interpreted as 5 points for excellence, 4 for very good, 3 for good, 2 for fair and 1 for bad performance. The result is then interpreted in compiled form.

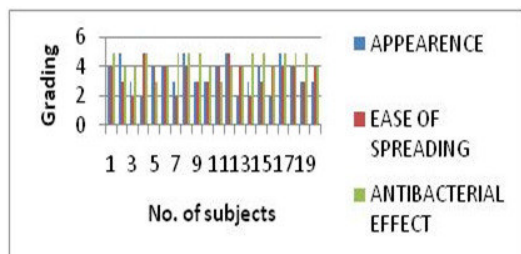
Observation Table for Subjective Evaluation:

Table no. 6 : - Evaluation of the foot cream with 7% Extract

Subject				Parameters for the evaluation of the product			
S N	Sex	Age	Skin type	Appearance	Spreadability	Antibacterial effect	Irritancy
1	F	20	Normal	4	4	5	NI
2	F	24	Combination	5	3	4	NI
3	F	25	Oily	3	2	4	NI
4	F	26	Dry	2	5	5	NI
5	F	45	Normal	4	4	3	NI
6	F	47	Dry	4	4	4	NI
7	M	48	Oily	3	2	5	NI
8	F	21	Normal	5	4	5	NI
9	F	33	Combination	3	3	5	NI
10	M	48	Combination	3	3	4	NI
11	F	38	Normal	4	4	3	NI
12	M	40	Normal	5	5	4	NI
13	F	40	Combination	2	4	4	NI
14	F	26	Oily	3	2	5	NI
15	F	28	Dry	4	3	5	NI
16	M	33	Combination	2	4	4	NI
17	F	33	Dry	5	4	5	NI
18	F	20	Normal	4	4	5	NI
19	M	32	Combination	3	3	5	NI
20	F	33	Combination	3	4	4	NI

Graphical Representation for Subjective Evaluation of foot cream containing 7% Ficus religiosa extract on 20 Subjects

Graph : Compiled result for subjective evaluation with 7% extract



RESULT AND DISCUSSION

From the antimicrobial test observation of *Ficus religiosa* bark aqueous extract it was observed that it has excellent antimicrobial activity against *E.coli*, *S.aureus*, *S.epidermidis*, *C. albicans*. From the result of antimicrobial analysis of cream containing different concentrations of *Ficus religiosa* bark aqueous extract it was found that it gives antimicrobial activity against microorganisms responsible for foot disorders. From the results of subjective evaluation it was found that foot cream containing 7% *Ficus religiosa* bark aqueous extract provides necessary protection to the foot skin infections and also gives healing property for cracked heels.

CONCLUSION:-

Thus from this study it can be concluded that *Ficus religiosa* foot cream was acceptable in view of colour, odour, consistency and antimicrobial property. *Ficus religiosa* is effective antimicrobial agent against *E. coli*, *S. aureus*, *S. epidermidis*, *C.albicans*, hence can prove to be beneficial for incorporating in antimicrobial preparations.

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