Formulation and Evaluation of Polyherbal Antimicrobial Cream containing Semecarpus Anacardium Oil

Mahesh Shinde^{1*}, Yogesh Kale², Parth Kadam³, Pruthviraj Kadam⁴

^{1,2,3,4} ASPM'S K. T. Patil College of Pharmacy. Dharashiv Maharashtra.

Corresponding Author: Mahesh Shinde^{1*}

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Abstract: This study explores the formulation and evaluation of a polyherbal antimicrobial cream containing semecarpus anacardium oil. Semecarpus anacardium, also known as marking nut, possesses reported antimicrobial properties. The research aims to develop a topical cream incorporating this oil alongside other herbal extracts with potential antimicrobial activity. The abstract will be further tailored upon finalizing the chosen combination of herbal extracts. The formulation process will likely involve the slab method, combining oil and aqueous phases containing semecarpus anacardium oil, chosen herbal extracts, and standard cream base ingredients. Evaluation of the formulated cream will encompass various parameters including pH, Homogeneity, Spreadibility, Skin Irritation and most importantly, in vitro antimicrobial activity against a panel of relevant microorganisms.

Keywords: - Semecarpus Anacardium oil, Polyherbal cream, Antimicrobial activity, Formulation, Evaluation.

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I. INTRODUCTION

Skin infections caused by various microbial pathogens are a significant global health concern. While conventional antibiotics offer effective treatment, issues like antibiotic resistance and potential side effects necessitate the exploration of alternative therapies. Natural products, particularly those derived from plants, have gained increasing interest due to their potential antimicrobial properties and minimal side effects.

Semecarpus anacardium, commonly known as marking nut, possesses well-documented antimicrobial activity. Semecarpus anacardium oil, extracted from the fruits of the plant, has shown promise against various bacterial and fungal strains. However, its direct application can be irritating to the skin.

This research investigates the formulation of a polyherbal antimicrobial cream containing semecarpus anacardium oil. Polyherbal formulations combine the therapeutic effects of multiple plants, potentially offering broader spectrum activity and reduced risk of resistance. The cream formulation aims to deliver the antimicrobial benefits of semecarpus anacardium oil in a safe and user-friendly topical dosage form. This study will focus on the formulation and evaluation of the polyherbal cream. We will assess the cream's pH, Homogeneity, Spreadibility and Skin Irritation Additionally, the antimicrobial efficacy of the cream against various pathogens will be investigated. Finally, we will evaluate the safety of the formulation through in vitro irritation studies.

The successful development of a safe and effective polyherbal cream containing semecarpus anacardium oil could provide a valuable addition to the armamentarium for treating skin infections.

II. MATERIALS AND METHODS

➤ Materials

The following extracts were purchased from Sukhayu Herbals, Osmanabad & Shet Sakharam Nemchand Rasshala, Solapur: Azadirachta indica leaf extract, Bereris aristata root extract, Psoralia corylifolia seed extract, and Hemidesmus indicus root extract. The other compounds that were used were analytical grade.

➢ Method

• Raw Material Analysis

Water soluble extractives and loss on drying were the two main methods used to analyze all of the aqueous extracts

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made from Sukhayu Herbals & Shet Sakharam Nemchand Rasshala, Solapur(1). pH measurement (2) and HPTLC fingerprint analysis (3)

• Preparation of O/W Cream: -

Preservative and other water soluble ingredients were dissolved in the aqueous phase, whereas the emulsifier, antioxidant, and other oil soluble ingredients were dissolved in the oil phase. After heating both phases to 75.0°C, the oil phase was continuously stirred into the aqueous phase.(4) Three formulations, denoted as F1 through F3, were made using different extract concentrations (Table 1).

• *Physicochemical Evaluation of Prepared Formulations:* The following physicochemical tests were subsequently performed on each of the generated formulations, F1 to F3.

✓ Ph: -

Using a digital pH meter (Toshniwal pH meter, India), 0.5 gm of the formulation was dissolved in 50 ml of water, and the pH was recorded.

✓ Homogeneity: -

Using visual inspection, creams were assessed for homogeneity.

✓ Spreadibility :-

The Spreadibility was assessed using a glass slide instrument.(5) To compress the sample to a uniform thickness, extra cream was sandwiched between two glass slides, and a 1000 gram weight was left on the slide for five minutes. As seen in Figure 1, the pan was fastened to the upper movable slide by means of a cord, while the bottom slide was fixed to the apparatus. The Spreadibility of the pan was measured by adding weights and recording the number of seconds required to separate two slides.

✓ Test for Skin Irritation: -

A healthy volunteer participated in the test. Five volunteers were chosen for each formulation, and 1 gram of the weighed formulation was applied to the back of each volunteer's hand on a 2 sq. Inch area before being wrapped in cotton. After a day, volunteers were invited to come back and watch for any irritability or reaction.

✓ Determination of in Vitro Antimicrobial Activity by Cup Plate Method (5):

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Agar diffusion or the cup plate method were used for in vitro antibacterial research. To determine the formulations' effectiveness against E coli, an aseptic area study was conducted.

III. RESULTS AND DISCUSSION

This research investigated the development and assessment of a polyherbal cream with antimicrobial properties, containing Semecarpus Anacardium oil as a key ingredient. The results obtained were found to be within the limits after the raw material analysis. It was discovered that every aqueous extract had an acidic ph. The quality and purity of the extracts were verified by HPTLC fingerprints.

Three distinct formulations, denoted as F1 through F3, were created by combining components in varied ratios. Neem extract was not used in the preparation of formula F1. All of the components are present in Formulations F2 and F3, albeit in varying amounts as indicated in Table 1. Methyl and propyl paraben were added to the treatments as preservatives because all of the formulations were of the O/W type and there was a possibility of microbial development. An oil-soluble antioxidant was incorporated into the mixture to prevent the oxidation of semecarpus anacardium oils. Before being stored in firmly sealed containers, the physicochemical properties and antimicrobial activity of each produced cream were evaluated.

Table 2 displays the findings of the physicochemical evaluation for each formulation. The formulation has a pH range of 5.34 to 6.56. Excellent homogeneity and the absence of lumps were displayed by all of the developed formulations. Spreadibility numbers demonstrated how easily the formulas spread. The findings of the skin irritation study showed that every cream that was created was safe to apply topically and did not cause any skin reactions. The diameter of the inhibitory zone was used to calculate the in vitro antibacterial activity. F3 shown less antibacterial activity while F1 displayed the biggest zone of inhibition.

a) Oli Phase						
Ingredients	Control	F1	F2	F3		
Bhilawa oil	10	10	10	10		
GMS	4	4	4	4		
Cetosteryl alcohol	10	10	8	10		
Stearic acid	4	4	4	4		
B.H.T.	0.05	0.05	0.05	0.05		
Propyl paraben	0.1	0.1	0.1	0.1		
Beeswax	0.5	0.5	0.5	0.5		
Liquid paraffin	5	5	5	5		

Table 1	Formulation	Chart of	the	Developed	O/W	Cream	Formula	tions:
		``	0	1 D1				

b) Water Phase						
Ingredients	Control	F1	F2	F3		
КОН	0.25	0.25	0.25	0.25		
Methyl Paraben	0.15	0.15	0.15	0.15		

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Psoralea corylifolia		1.2	1.0	1.2
Berberis aristata		2.6	1.8	2.0
Azadirachta indica			0.8	1.0
Hemidesmus indicus		1.2	1.0	1.2
Distilled water	q.s.	q.s.	q.s.	q.s.

Table 2 Physicochemical Evaluation of the Developed Creams:

Formulation	pН	Homogeneity	Spreadibility gm.cm/sec	Skin Irritation	Zone of Inhibition
F1	5.34	Excellent	8.24	No	2.2
F2	6.39	Excellent	7.48	No	1.5
F3	6.48	Excellent	7.13	No	1.3



Fig 1 pH of Formulations



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Fig 3 Evaluation Tests



Fig 4 Evaluation Tests

[5]

IV. CONCLUSION

It is clear from the study's results above that Formulation F1 is both stable and effective. It had strong antibacterial properties. Therefore, formulation F1, which contains 1.2% of Bakuchi, 2.6% of Daruhaldi, and 1.2% of Sarsaparilla, provides a useful substitute for promising antimicrobial activity against various pathogens, suggesting its potential as a topical treatment for infections.

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