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Research Article

Formulation, Evaluation Of Antifungal Cream Form *Pongamia Pinnata*

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ABSTRACT

Background: The aim of this present research work is to formulate and evaluate anti scabies cream. Scabies has been scourged among human beings for thousands of years. It's worldwide occurrence with epidemics during war, famine and overcrowding which is responsible for an estimated 300 million peoples currently infested. It is also greatest impact on children. Scabies refers to various skin infections produced by female mites and their eggs deposited in epidermis of the host. Long- term scabies disease can lead to complications such as septicemia, acute post- streptococcus glomerulonephritis, heart disease, and secondary infections. Timely treatment to the affected patients is required to control the disease and get rid of the causative agent. **Method:** The cream formulation was designed by using *pongamia pinnata* leaves, neem oil, steric acid, potassium hydroxide, sodium carbonate, white soft paraffin, methyl alcohol, glycerin, methyl paraffin and required amount of rose oil or distilled water The. skin pH, (6.8-7) was maintained by drop wise addition of try-ethanolamine. The prepared cream was evaluated for physical appearance, pH, skin irritation to observed side effect. It was inferred from the result that cream formulation were good in appearance and homogeneity. The overall result of the research the prepared cream formulation shows significant anti- fungal activity. **Result:** The antifungal cream is assessed utilizing a variety of chemical and physiological assays. Information on numerous formulation parameters is provided by these tests. the tests' findings were documented. Numerous secondary metabolites were examined, such as phytosterols, alkaloids, glycosides, flavonoids, saponins, tannins, and phenolic substances. **Conclusion:** The oil phase of the cream base consisted of stearic acid, potassium hydroxide, sodium carbonate, white soft paraffin and rose oil. The aqueous phase consists of methanol extract of *Pongamia pinnata*, glycerin, distilled water and methylparaben. Three batches namely F1, F2 and F3 was prepared with varying concentrations. The characterization of the formulated cream was carried out by standard methods such as homogeneity test, pH test, irretence test and removal test.

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INTRODUCTION

Fungal infection:

One of the most common dermatological problems in the world today is fungal infections of the skin. Forty million people worldwide suffer from fungal infections. Surface- level fungal infections of the skin, hair, and nails are common and usually difficult to treat. The most common causes of tinea include dermatophytes, barbae, pedis, capitis, corporis, and onychomycosis. Two more prevalent superficial cutaneous fungal infections include candidal infections and Pityriasis versicolor. A range of synthetic antifungal medications classified into four primary groups azoles, allylamines, echinocandins, and polyenes are used in clinical settings to treat similar fungal infections. Medication resistance is one problem that has plagued modern medicine despite its progress. However, it is widely known that azole resistance. Third behind bacterial and viral diseases, fungal diseases accounted for a large fraction of all animal and human diseases. Topical antifungals are medications that are used topically to the skin, nails, hair, vaginally, or within the mouth to treat fungal infections. They come in a variety of forms, including tinctures, creams, gels, lotions, nail lacquers, ointments, powders, shampoos, and sprays. It is possible for dermatophytes, yeasts, or molds to produce fungal infections. The approximately forty distinct species of dermatophytes derive their nourishment from keratinized materials, making them the usual culprits behind fungal diseases affecting the skin, scalp, or nails.

Although yeasts are common skin occupants, occasionally they can proliferate unchecked and cause infections with symptoms. Molds can result in difficult-to-treat nail infections or tinea nigra, which are rare causes of fungal infections that create painless brown or black patches on the skin. Some antifungal medications, including nystatin, are not appropriate for treating dermatophyte fungal infections, however the majority of them treat both yeast and dermatophyte infections.

To find novel lead compounds, plant extracts were screened for secondary metabolites with biologically significant activity. The purpose of this research was to identify specific extracts that might be helpful in the creation of novel instruments for the management of fungal-related diseases in both humans and plants. Consequently, two plant harmful fungal strains (Helminthosporium turcicum and Alternaria solani) and two human pathogenic fungi (Candida albicans and Epidermophyton floccusum) were tested using extracts from the plant species Pongamia pinnata in a methodical manner.

Cream:

Creams are defined as semisolid, externally applied emulsions of the water-in-oil (w/o) or oil-in-water (o/w) type. Oil-in-water and water-in-oil are the two stages that make up cream. The best solution for addressing skin issues is to use cosmetic items. By reducing skin issues, cosmetics are utilized not only to enhance one's appearance but also to promote health. A cream is a topical preparation that is often applied topically to the skin. Additionally, creams for mucus membrane application such as those of the vagina or rectum are utilized. Creams could be categorized as pharmaceutical goods since unmedicated creams are frequently used for a range of skin problems, including dermatoses, and even cosmetic creams are based on methods created by pharmacies.

The Fingertip unit idea might be useful in determining the quantity of topical cream needed to cover various locations. Creams are dosage forms that are semisolid and include one or more medication ingredients that have been dissolved or spread in an appropriate base. Historically, this term has been used to describe semisolids with a somewhat fluid viscosity that are prepared as oil-in-water (such as Fluocinolone Acetonide Cream) or water-in-oil (such as Cold Cream) emulsions.

Advantages of Topical Drug Delivery Systems:

- Avoidance of first pass metabolism.
- Convenient and easy to apply.
- Avoid of risk.
- Inconveniences of intravenous therapy and of the varied conditions of absorption like Ph changes presence of enzymes gastric emptying time etc.
- Achievement of efficacy with lower total daily dosage of drug by continuous drug input.
- Avoid fluctuation of drug levels inter-and interpatient variations.

Structure and composition of Skin:

The skin makes up almost 15% of an adult's total body weight, making it the biggest organ in the body. In addition to preventing the body from losing too much water and helping with thermoregulation, it carries out a number of essential tasks, including as providing defense against external physical, chemical, and biological threats. Mucous membranes line the exterior of the body, forming a continuous layer of skin.

The skin and its derived tissues make up the integumentary system. The epidermis, dermis, and subcutaneous tissue are the three layers that make up the skin. The outermost layer, the epidermis, is made up of a particular kind of cells called keratinocytes, which are responsible for producing the protective protein keratin, which is a long, thread-like strand. Collagen is essentially a fibrillar structural protein that makes up the middle layer, or dermis.

The subcutaneous tissue, or panniculus, on which the dermis is located, is made up of tiny lobes of fat cells called lipocytes. Depending on the precise position within the body's anatomy, these layers' thicknesses vary significantly. The epidermal layer on the eyelid, for instance, is the thinnest at less than 0.1 mm, while the thickest epidermal layer, reaching around 1.5 mm, is found on the palms and soles of feet. In comparison to the epidermis that covers it, the dermis is 30– 40 times thicker on the back.

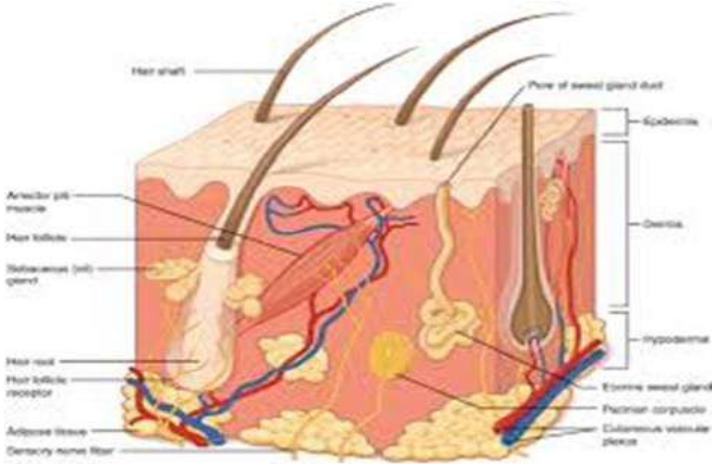

Fig No.1 Structure of Human Skin

Epidermis:

The epidermis, the outer west surface, is composed of cell types that include dendritic cells, Langerhans cells, melanocytes, and Merkel cells. None of these forementioned cell types is as populous as the keratinocytes, which comprise at least an- 85% of epidermal cells. Keratinocytes result in the formation of keratin, which establishes a stratified squamosal network that can be described as the epidermal coat. The epidermis does not contain aver of blood vessels, but it is thin enough that it supported entirely by underthing dermal networks.

The epidermis contains the melanocytes, which are the cells of origin of malignant melanoma. Melanin, which comes hum melanocytes, has a protective function agatize ultraviolet light and is situated mainly in the stratum basal of the epidermis. The keratinocyte moves from dermal-epidermal attachments up toward the surface, creating distinct epidermal layers through its progression." The thickness of the epidermis varies depending on location with the eyelids and postauricular area being the thinnest (-0.05 mm thick) and the palms and soles being the thickest (-1.5 mm thick).

The stratum corneum is the outermost layer of the epidermis and is largely lipophilic; although it does contain some water, it is <20% of its total composition. Accordingly, its thickness varies on the basis of its state of hydration from 10 to 20 μm. It is the stratum corneum, which plays the most important role as the barrier that helps prevent entry of harmful pathogens. The slightly acidic pH of the stratum corneum contributes to its pathogenic averting properties.

The stratum corneum serves as a conduit for conducting skin sensation, and this is a direct result of its mechanical properties such as elasticity and yield stress. There is a network of cells, known as corneocytes, which are completely surrounded in a lipid layer and comprise the majority of the stratum corneum. These corneocytes are actually the terminally differentiated form of the keratinocyte cell.

It is these corneocytes that are directly responsible for the mechanical barrier that is created, and its lipophilic properties permit fluid retention. One important aspect to bear in mind is that the stratum corneum consists of a nucleated or dead cell, making it the final phase of keratinocyte differentiation. The stratum lucidum will be mentioned briefly for purposes of completion. However, it should be noted that the facial, head, and neck skin does not contain this layer.

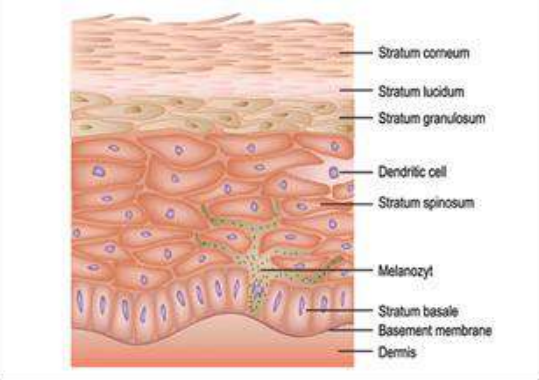

Fig no.2 structure of epidermis

Dermis:

The dermis is elastic and hard. It is composed of connective tissue, and collagen fibers intertwined with elastic Fibers make up the matrix. Stretch marks are a typical side effect of pregnancy and obesity that are caused by the rupturing of clastic Fibers when the skin is overextended. Wrinkles result from the skin losing part of its tensile strength and ability to retain water as we age.

The following structures are present in the dermis:

- Sensitive nerve endings; Tiny blood and lymph vessels
- The ducts that carry sweat glands
- Sebaceous glands, hairs, and arrector pili muscles.

Hypodermis:

The hypodermis, or subcutaneous tissue, is composed of a layer of fat cells arranged into lobules connected by collagen and elastin fibers. Its primary functions are to protect against physical stress and to insulate against heat. Additionally, it has energy reserves that it can release as needed. The layer that joins blood veins and nerves to the skin is called the hypodermis.[9]

Candida albicans:

The human intestine is home to the common opportunistic pathogenic yeast Candida albicans. In the absence of a human body, it can also live. It is found in the oral and gastrointestinal tracts in 40–60% of healthy persons. It is generally a

commensal organism, but in immunocompromised people, it can become pathogenic for a number of causes. This type of Candida is one of the uncommon ones that can cause candidiasis
in people. Excessive amounts of the fungus are the cause of the sickness. For instance, people who are HIV-positive frequently have candidiasis.

The most often isolated fungus from biofilms on human tissue or (permanently) implanted medical devices is Candida albicans. Candida albicans, Candida tropicalis, Candida parasitosis, and Candida glabrata together account for 50–90% of human cases of candidiasis. Patients with systemic candidiasis linked to Candida albicansis have a 40% death rate. It is estimated that invasive candidiasis acquired in a hospital result in 2,800–11,200 deaths annually in the United States.

These numbers could not accurately reflect the degree of the harm that Candida albicans does, though, as new research has shown that the bacteria can penetrate the blood- brain barrier in animals. Candida albicans is a typical model organism used to study fungal diseases. It is commonly called a dimorphic fungus since it may grow into yeast or filamentous cells. It does, nevertheless, possess a variety of morphological morphologies, such as opaque, pseudo hyphal, and GUT forms. It was once thought that Candida albicans, without a haploid stage, was an essential diploid organism.

This is not accurate, though. In addition to the haploid stage, a tetraploid form of Candida albicans can also exist. The latter results from the mating of diploid, opaque Candida albicans cells. Up to 70% of the genes that code for proteins are yet undiscovered within the roughly 29 Mb diploid genome. Because the media affects the morphology of Candida albicans, a variety of investigations can be conducted based on it. The unique medium Chromecast Candida can be used to distinguish between different kinds of candida.

Materials And Methodology

Preformulation Study:

Preformulation testing is the first step in rational development of dosage forms of a drug substance. Preformulation study is the process of optimizing the delivery of drug through determination of phytochemical properties of the new compound that could affect drug performance and development of an efficacious, stable and safe dosage form. It gives the information needed to define the nature of the substance and provide a framework for the drug combination with pharmaceutical excipients in the dosage form. Hence Preformulation study was performed for the herbal extracts for identification and compatibility.

Collected of Pongamia Pinnata L.

The pongamia Pinnata L were collected from the Pattan Kodoli, Kolhapur and authenticated **(accession no: RMRC-1832) by Dr. Harsha Hegde, Scientist-E, Indian council of medical research (ICMR) Belagavi, Karnataka, India.**

Fig No.3 ***Pongamia pinnata L***

Preparation of extract:

The dried leaves of plant *pongamia pinnata* washed under running water to remove foreign substance later thoroughly dried and finely powder and further used for preparing the herb extract.

Table No.1 Formulation Table for Cream

Ingredients	Quantity		
	F1 (15gm)	**F2 (15gm)**	**F3 (15gm)**
Leave extract of pongamia pinnata	1.5gm	2gm	2.5gm
Neem oil	0.5ml	0.5ml	0.5ml
Stearic acid	2gm	1.5gm	1.5gm
Potassium hydroxide	1.5gm	1gm	1gm
Sodium carbonate	1.5gm	1.5gm	1.5gm
White soft paraffin	1.5gm	1.5gm	1.5gm
Methanol	1.5gm	1.5gm	1.5gm
Glycerin	2ml	2ml	2ml
Methyl paraben	1.5gm	1.5gm	1.5gm
Rose oil	0.5ml	0.5ml	0.5ml
Distilled water	q. s	q. s	q. s

Extraction Method

We gathered fresh pongamia pinnata leaves. from Pattan Kodoli, Kolhapur, Maharashtra. Clean distilled water is used to wash these leaves until all of the dust has been removed. All of these leaves are dried in the shade after being cleaned. The Soxhlet extraction method was used to carry out the extraction. The 25 gm finely ground Datura stramonium L. Leaves were firmly packed in a separate Soxhlet extractor. 250 ml of methanol were utilized as the extraction solvent. This method involved using an evaporator to evaporate the liquid to a dryness at 60 degrees Celsius with lowered pressure.

Method Of Preparation:

Take another 25 grams of pongamia pinnata powder and dissolve it in 250 ml of methanol.

1. Use a Soxhlet equipment to perform the extraction. Following the evaporation of the solvent from the extractions in a rotary evaporator.
2. After that, the mixture was put into a container and labelled.

Method Of Preparation Of Cream:

Fig No.4 *Pongamia pinnata* leaves powder

Fig No.5 Soxhlet extraction

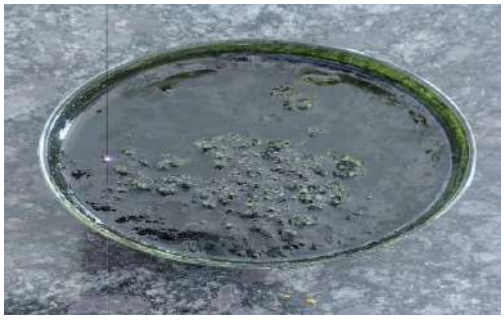

Fig No.6 Extraction

Fig No.7 Other excipient

Fig No.8 Formulation F1, F2, F3

Evaluation Parameter Of Anti-Fungal Cream

Phytochemical Screening of *pongamia pinnata leaves*:

1. Test for Alkaloids:

Extracts were dissolved individually in dilute hydrochloric acid and filtered.

The filtrates were tested carefully with alkaloid reagents.

Meyer's Test:

Filtrates were treated with Mayer's reagent (potassium mercuric iodide). The formation of a yellow cream precipitate indicated the presence of alkaloids.

2. Test for Flavonoids:

Lead Acetate Test:

The extracts were treated with few drops of 10% lead acetate solution. The formation of yellow precipitate confirmed the presence of flavonoids.

3. Test for Amino Acids:

Millons Test:

The tracts were treated with 2 ml of Millons reagent. The formation of white precipitate, which turned to red upon heating, indicated the presence of proteins and amino acids.

4. Test for glycoside:

Keller Killani test:

0.5 g of dried extract was dissolved in 2 ml of glacial acetic acid containing one drop of ferric chloride solutions. This was then under laid with 1 ml of concentrated H2SO4. A brown ring obtained at the junction of two liquids indicates the presence of a deoxysugars.

5. Test for Saponins:

Froth's Test:

The extracts (alcoholic and aqueous) were diluted with 20 ml of distilled water separately and further shaken for 15 min in a graduated cylinder. A layer of foam measuring about 1 cm was formed which indicated the presence of saponins.

6. Test for Phytosterols:

Liebermann-Burchard's Test:

The extracts were treated with chloroform and filtered. The filtrates were treated with few drops of acetic anhydride boiled and cooled concentrated sulphuric acid was added through the sides of the test tube. The formation of brown coloured ring at the junction of two liquids confirmed the presence of steroids.

7. Test for Phenolic Compounds and Tannins:

Gelatin Test:

To the extract, 1% gelatin solution containing sodium chloride was added. The formation of white precipitate indicated the presence of tannins. [32]

Physicochemical Evaluation Of Anti-Fungal Cream

Cream was evaluated for their pH, homogeneity, type of smear, removal, Saponification value and irritancy test and feel checked of the prepared formulation. All study were carried out and average value were reported.

Evaluation Of Cream:

1. pH of the Cream:

The pH meter was calibrated using standard buffer solution. About 5g of the cream was weighed and dissolved in 100 ml of distilled water and its pH was measured.

2. Homogeneity:

The formulations were tested for the homogeneity by visual appearance and by touch.

3. Type of smear

After application of cream, the type of film or smear formed on the skin were checked.

4. Removal

The ease of removal of the cream applied was examined by washing the applied part with tap water.

5. Saponification value

Introduce about 2 gm of substance refluxed with 25 ml of 0.5 N alcoholic KOH for 30 minutes, to this 1 ml of phenolphthalein added and titrated immediately, with 0.5 N HCL. Saponification value = (b-a) *28.05/w a - volume in ml of titrant, b - volume in ml of titrant, w - weigh of substance in gm.

6. Irritancy test

Mark an area (1sq.cm) on the left-hand dorsal surface. The cream was applied to the specified area and time was noted. Irritancy, erythema, edema, was checked if any for regular intervals up to 24 hrs and reported.

RESULT AND DISCUSSION

Formulation of cream:

The substances listed in **table No. 1** number were employed to produce the transdermal cream, and the plant material used in the formulation is abundant in a variety of phytochemicals, Alkaloids, flavonoids, phenolic compounds, Glycosides, Saponins & Tannins which exhibits antifungal activity are the components of these phytochemicals. Transdermal cream evaluated using a battery of physiological and chemical testing. This test yielded information about a

number of formulation parameters, and the results were tabulated.

Evaluation tests for the antifungal cream:

The antifungal cream is assessed utilizing a variety of chemical and physiological assays. Information on numerous formulation parameters is provided by these tests. the tests' findings were documented.

Phytochemical screening:

Phytochemicals are chemical substances that naturally occur in plants. They impart colour and organoleptic qualities to the plant. Tannins, flavonoids, saponins, alkaloids, phytosterols, and other phytochemicals are among those recognised to have therapeutic and physiological effects. Numerous secondary metabolites were examined, such as phytosterols, alkaloids, glycosides, flavonoids, saponins, tannins, and phenolic substances. The same's findings are given in table no 2and figure no 9.

Fig No.9 Phytochemical Screening of *pongamia pinnata L*. Leaves

Table No.2 Phytochemical Screening of Methanolic Extracts of Plant

TEST	*Pongamia pinnata L*
Alkaloids	+
Flavonoids	+
Amino acid	-
Glycosides	+
Saponins	+
Phytosterols	+
Phenolic /Tannins	+

(+) indicates presence whereas (–) indicates absence of the phytochemical

Physical appearance and content analysis:

1. pH of the Cream

The pH of the cream base was found to be in range of 5.4-5.9 which is good for skin pH. All the formulations of cream base were shown pH nearer to skin required to shown in figure no 10.

Fig No. 10 pH of formulation

2.Homogeneity

All formulations of base produce uniform distribution in cream. This was confirmed by visual appearance and by touch.

3.Type of smear

After application of cream base, the type of smear formed on the skin were non greasy.

4.Removal

The cream applied on skin was easily removed by washing with tap water.

5.Saponification value

The results of acid value and saponification value of all formulation of cream base were presented in table no 3, and showed satisfactorily value.

Table No.3 Saponification value

Batch	F1	F2	F3
Saponification value	26.7	27	25.4

6.Irritancy test

The formulation shows no redness, edema, Inflammation and irritation during irritancy studies. These formulations are safe to use for skin.

Mic Test

Observation table:

Table No.4 determination of MIC by using different conc. for candida albicans

Sr No	Sample	Concentration on (Mg/ml)	Candida albicans
1	Sample -F 3	100	–
		50	–
		25	–
		12.5	+
		6.25	++

("+" -Turbidity/growth, "-" No turbidity/no growth "++" extreme growth)

CONCLUSION

The phytochemical component of the *Pongamia Pinnata* leaves was analysed. Anti- Fungal cream containing *Pongamia Pinnata* leaves extract can be successfully prepared using Neem oil & Other excipients. The Anti- Fungal cream prepared from *Pongamia Pinnata* leaves extract is an ideal topical preparation.

The *Pongamia Pinnata* leaves extract in the form of cream possess significant topical use anti-

fungal. Formulation F3 was better than that of F1 & F2. From among all the developed formulation, F3 shows better spreadability, consistency and physical appearance. pH of the F3 batch is Sufficient to treat the infection, also shows fungal activity. F3 batch shows the good results than other batches so F3 batch is suitable for anti-fungal use. The prepared formulation was evaluated by various parameters. All of the evaluation tests were passed by the formulation.

The present study showed that the *Pongamia Pinnata* leaves extract possesses higher anti-fungal properties when compared with standard drugs. It has been observed that the demand for plant based healthcare and cosmetic preparations has increased over the last few years due to increased adverse effects caused by the synthetic chemicals used in the developing products.

The main purpose of this study was to formulate a stable and functionally effective anti- fungal cream with addition herbs with synthetic chemicals. The research concluded that natural remedies are more acceptable and are safer with minimum side effects than synthetic preparation. The data presented in this study; it was demonstrated that the developed cream processes significant, therapeutically efficacious, suitable vehicle for drug delivery in low cost but definitely with high potential. The formulated anti-fungal was show the good scope in future about research in natural remedies.

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