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RESEARCH ARTICLE ON FORMULATION OF TRANSDERMAL ANTIFUNGAL CREAM BY USING CASSIA FISTULA EXTRACT OF HERBAL PREPARATION

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ABSTRACT

The purpose of the study was to produce herbal preparation of antifungal cream with a composition of the herb cassia fistula Linn for treating fungal skin infections. These creams belong to herbal medicinal cream which containing herbal antifungal drug. For treatment of skin infection caused by fungi belong to family ***Candida and Aspergillum spp***. the formulation containing herbal antifungal drug which has broad spectrum of antifungal activity. When Transdermal drug delivery is one of the most prospective strategies for medication application through the skin, particularly the stratum conium, which features a horrible barrier to drug penetration, limiting topical and transdermal bioavailability. So skin penetration improvement techniques have been created to improve bioavailability and expand the range of medications, with topical and transdermal delivery being a potential option. The procedure is generally non-invasive, widely accepted by patients, and can be utilized to provide local delivery over a number of days. In which used a various types of chemical agent for enhancing penetration power of skin. Topical formulation (cream or gels) which play most important role. Because of several advantages it contains skin penetration enhancer which enhanced penetration power of cream which increased bioavailability. The purpose of this page is to provide a complete summary of the outcomes from scientific studies undertaken on antifungal activity

of cassia fistula and skin penetration enhancer of synthetic or natural origin. Essential oils, fatty acids, terpenes, and polysaccharides. In transdermal cream.

KEYWORDS: ***Cassia fistula,*** Antifungal infection, skin penetration enhancer, Essential oils, herbal cream.

INTRODUCTION

Fungal infections are emerging diseases in sanatoriums. The rise in immunosuppressive diseases and circumstances has influenced the epidemiological pattern of mycoses in hospitalized patients. The epidemiology of invasive fungal infections is now at a critical stage. Fungal infection caused by ***Candida*** has become more prevalent than ***Escherichia coli*** and ***Pseudomonas sp. Aspergillums sp***. and other species. There are many host factors that predispose patients to fungal infections.[34] the skin is the largest organ of human body, which comprise about 50% of total adult body weight. It has much important function such as preventing excess water loss from the body and protecting the body against external physical, biological and chemical assailants. The skin infection has highly prevalence rate rich sup to percentage in developing country lack of awareness and understanding of risk factor skin infection is a major reason for development of skin infection. Skin has two primary layers. An outer thinner layer, the outermost layer of the skin and the inner thicker layer known as Dermis below dermis is present as subcutaneous layer called Hypodermis. The diagram showing different layer of skin is depicted in figure 1.

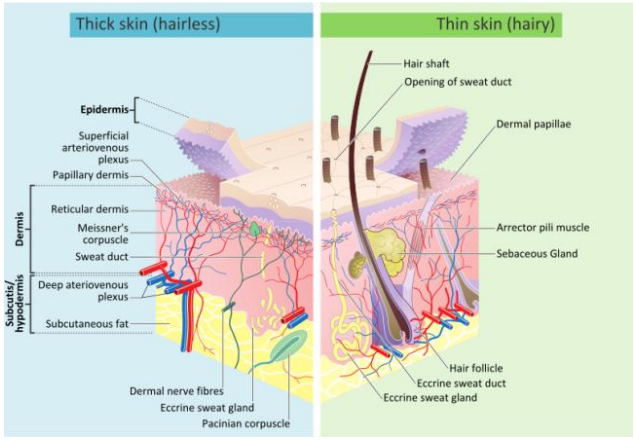

Fig. 01: Diagram of different layer of skin.[35]

1. STRATUM CORNEUM

The outermost layer of the epidermis that is exposed to the outside world is called the stratum conium. It is composed of numerous stacked layers of compressed, flattened, dehydrated, and

keratinized cells. There are 15–30 layers of dead keratinocytes inside the cornified cells. It offers a layer of defence against heat and light. Protein, fats, phospholipids, and cholesterol sulphate are all present. This It is composed of 750–1200 micrometer-surface area flat plate-like structure.[36,37] The cells of this layer periodically shed off after fifteen days, and after four weeks, new cells originating in the germinative layer entirely replace the old cells.

2. VIABLE EPIDERMIS

This layer lies between non viable epidermis (stratum conium) and dermis, held by tonofibrils. The layer is physiochemical almost similar to living cells or tissues with a thickness of 50-100 micrometer.[36,37]

3. VIABLE DERMIS

Collagen and elastic fibbers make up the connective tissues that make up this layer. Moreover, it has fibroblasts, adiposities (fat cells), and macrophages (engulfment). Their thickness ranges from 2000 to 3000 micrometers; they are thin in the scrotum and penis and thick in the palms and soles. The dermis layer contains numerous nerves, blood vessels, and hair follicles embedded in it. Additionally, it has projections that resemble fingers and are known as dermal papillae; these often enhance the surface area.

The structure in dermis is

- Blood vessels, Lymph vessels
- Sensory nerve endings
- Sweat gland and their ducts
- Hair follicles, hair roots
- Arrestor spilorum
- Sebaceous glands
- Fibroblast, macrophage and mast cell are the main cells found in Dermis.

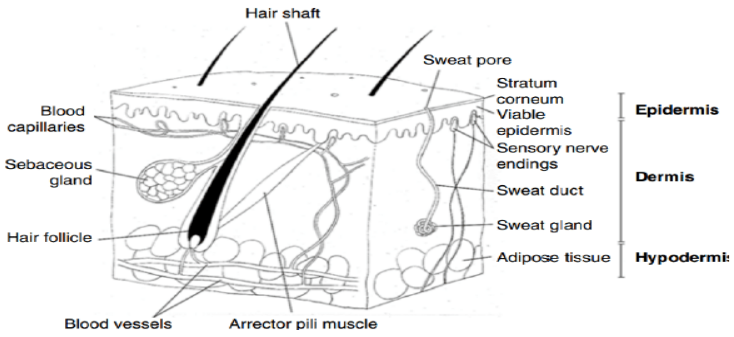

Fig. 02: Viable dermis.

The dermis consists of two layers of connective tissue that are produce by fibroblast and interconnected by lattice of elating and collagen fibber these are as follow.

- **Papillary layer**

It is made of loose areolar connective tissue. These layers extended to Innermost layer of epidermis i.e. stratum germinativum and form finger like papillae. The papillae contain fibroblast, adiposities, lymphatic capillaries, nerve fibber, and touch receptor and phagocyte etc. phagocyte play defensive role against microbes and infection that penetrated into skin.

- **Reticular layer**

Below the papillary layer the thick reticular layer are present it consists of denseir regular connective tissue. It appears reticulated or net like due to tight inter linked collagen elastin fibbers. Elastin fibbers produce elasticity and collagen fibber provides tensile strength to the skin. Collagen binds with water molecule and makes skin moist.

4. HYPODERMIS

Hypodermis also known as subcutaneous layer it was related to the skin, fibrous bone tissue, and muscles. It is a white fibrous tissue that contains lymph nodes, blood vessels, cutaneous nerves, and sweat glands.

FUNCTION OF SKIN

- **Secretion of sweat-** The sweat is secreted from the sweat gland. Sweat glad are stimulated when there is an increase in body temperature by 0.25 c to 0.5 c these sweat also helpful in maintenance of the body.
- **Sensation-** Sensory nerve ending are present in the skin and protect the body against stimuli such as pressure, heat, cold and by reflex Action.
- **Absorption-** The skin can absorb lipid soluble substance, some drugs, oxygen, nitrogen and carbon dioxide.
- **Elimination of waste-** The skin excretes waste products emitted from the body, such as water, urea, ammonia, and uric acid.
- **Protection-** Skin protect the deeper and delicate structure and act as barrier against invasion of harmful microorganism, chemical, physical injury, UV radiation etc.

PENETRATION ENHANCER

Penetration enhancers may be defined as chemicals which patronize drug flux and interaction of drug with constituents of skin. This increases the skin permeation. They are often known as absorption or promoter enhancers as they increase the absorption of the drug or substance via skin. They also increase the skin permeability.

Ideal penetration enhancers should impart following properties

- It must be chemically sable and non toxic.
- It must be non-irritant, inert as well as non allergic
- Should not impart pharmacological activity inside the body
- It should be Odourless and Colourless.
- It should non expensive and Available easily.
- Should be accepted cosmetically
- Rapid onset of action.

PENETRATION ENHANCERS MODE OF ACTION

Permeation of drug is enhanced by the penetration enhancers by several mechanisms. These enhancers may be used individually or in combination to exert different effects.

One of the major mechanisms of the chemical penetration enhancers are

- Intercellular protein interaction
- Improved partition of drug through stratum conium
- Lipid layer disruption design principle, components and its merits over other conventional engines.[3]

Approaches for permeation enhancement

There are primarily three ways for penetration enhancement.

There are three approaches

- Chemical,
- Biochemical, and
- Physical.

CHEMICAL APPROACH

Penetration enhancers operate primarily in three ways.

1. By triggering modifications to the stratum carenum highly organized structure.

2. Interaction with intracellular present proteins.
3. With the help of a co-enhancer (i.e., solvent), the stratum corneum's drug partition is improved.

The enhancers work by altering one of the three routes, according to number this can be accomplished in one of two ways: by altering the skin proteins' structure or by causing the solvent to swell. The stratum conium becomes more lipophilic, for instance, as a result of the fatty acid boosters. The enhancers' function is to increase the drug's solubility on the SC so that it will diffuse into the skin's surface. The parameters that determine the rate of drug penetration into the SC for steady state flux 4 are stated in the equation below. The steady flux, dm/dt, and mass m of the diffusing sub-stance per unit area are related by the following equation.[5]

EXAMPLES: Alcohol propylene glycol, amines and amides cyclodextrines, pyolidone, n-methyle pyrolidone, fatty acids, sulfoxide etc.

BIOCHEMICAL APPROACH

Development of Bio-convertible Pro-Drugs: N-acyl derivatives were created to increase permeability of 5-fluorouracil by 25 times.

S6-acyloxymethyl and 9-dialkylaminomethyl pro-moieties acted as permeation enhancers to 6-mercaptopurine. Pro-drugs help to obtain an optimal partition coefficient for entering the skin barrier and after absorption and diffusion to the viable tissues, enzymes convert the pro-drug into the active form. Pro-drugs have also been used to make non-steroidal anti-inflammatory drugs like nalbuphine, buprenorphine, beta-blockers, and others more permeable to the skin. One interventional strategy described for permeation promotion via human skin involves co-administration of skin metabolism inhibitors. Skin is to interfere with barrier homeostasis by altering one or all of the processes of bringing together of the lamellar membranes, synthesis, assembly, secretion, processing and activation.

PHYSICAL APPROACH

- **Iontophoresis:** is a mechanism that involves drug diffusion, migration, or electro-osmosis over a concentration gradient in the skin. The bulk of the fluid and the opposing ions move in the same direction during electro-osmosis. The idea behind iontophoresis is that there is no concentration gradient in the fluid flow. The skin is naturally somewhat negatively

charged, which causes counter ions to develop into the cations. From the cathode to the anode, flow occurs in accordance with the electro-osmotic principle. By improving their flow, cationic medicines are more readily absorbed as a result. For iontophoresis, continuous DC current was first used, however these days; pulsed waveforms of DC are also employed to boost penetration. For instance, when the procedure was carried out utilizing a pulsed DC rather than a continuous DC, the flux of TRH (Thyrotrophic Releasing Hormone) increased considerably. Additionally, pulsed DC has less of an adverse impact on the skin. As it changes the SC 10's barrier function, iontophoresis causes skin permeability to rise. Certain medications, such as a number of high molecular weight proteins, peptides, and oligonucleotides, are highly difficult to deliver or can only be given parent rally. Iontophoresis has a significant role in improving the uptake of such medicines.

- **Sonophoresis:** Sonophoresis is the process by which skin becomes more permeable when exposed to ultrasound.

- **Mechanism of action:** Several events are said to occur in the skin when exposed to US (ultrasound), according to numerous scientific research.

These consist of

a) Cavitations effects.
b) Convective transport.
c) Thermal effects.
d) Mechanically occurring effects.

- **Cavitations effects:** Vapour cavities emerge when a liquid medium is subjected to US. Cavitations are the name of this procedure. Cavitations are mostly caused by pressure changes that are created in the medium. Due to cavitations, the lipid belayed of the SC is altered, and aqueous channels develop through the skin for drug permeation. Cavitations occurs when small vapour cavities form a cluster during the negative part of the alternate US pressure cycles, and these clusters grow subsequently in further pressure cycles.

- **Convective transport**

Whenever a porous media is subjected to ultrasound, interference arises between incidents and reflected US waves.

Cavitation bubbles also undergo oscillations due to which different velocities are produced in the fluid.

- **Thermal effects**

When US is absorbed the temperature of the absorbing medium rises. This temperature rise is related to the intensity of US and the duration of exposure. As an outcome, the medium's absorption coefficient rises. In human words, bone has a higher absorption coefficient than muscle tissue. As a result, they are at greater risk of thermal injury. Ultrasound could harm the medium, therefore scientists devised a safety criterion known as time to threshold (TT). This parameter indicates the time for which the US could be applied on to the tissue if its threshold limit is known.

- **Mechanical effects:** Ultrasound causes many variations in the skin such as sinusoidal pressure variation and thus sinusoidal density variations. As it all depends on the US frequency so at frequency above 1 MHz there are no cavitations effects and the density variations occur rapidly and thus the growth of small gaseous nucleus is slowed. But rapid density variations lead to medium fatigue. As a result, disruptions occur in the lipid bilayers and thereby increasing the permeation through it.

- **Thermal Energy:** When the US is applied to the skin, the temperature rises. As a result, the skin becomes more permeable, which allows drugs to enter the bloodstream. [Salt Lake City, UT, USA]-based Zars, lnc. Has imitated this strategy. They created a miniature heating device called CHADD that emits heat for a predetermined amount of time and power. Controlled Heat-aided Drug Delivery system is the full name of CHADD. Within the heating unit 13, an oxidation reaction takes place.[13]

- **Stratum Corneum Hydration:** The stratum conium contains between 15% and 20% water. According to the postulated mechanism, the SC would inflate up and become more permeable as the water quantity was increased. The laboratory has not yet used this mechanism. The occlusion concept could be used to accomplish this on a practical and affordable level, stopping the flow of water from the skin's surface. Many ointments, oils, waxes, paraffin’s, and other emulsions could be used for this. The most efficient of these plastic sheets and greasy substances are.[14]

ADVANTAGE

Permeation enhancers provide us the following advantages

- Sufficiently high rate of penetration for therapeutic efficiency.
- It helps to make permeation of unabsorvable drug through skin.
- Improved penetration of transdermal surface preparations.
- No negative effects.
- These are anti-septic substances.
- No effect on the zero order skin permeation profile of skin.

LIMITATIONS

- The concentration of different drugs can be different so same amount of dosage cannot be administered.
- Several permeation enhancers should strictly not be given at different concentrations at the same time.
- There is a high risk of side-effects due to this enhancer For instance many penetration enhancers cause skin irritation or other allergic reaction.

Different type of penetration enhancer

- **Essential oil**

Essential oils are volatile, odorous compounds found in the flowers, fruit, leaves, and roots of certain plants. The extraction of these odoriferous compounds from plants has been an important occupation for over two thousand years. The difference between essential oil and fatty acid is shown below in table 1. Eucalyptus oil, an essential oil derived from the eucalyptus radiate family myrtaceous, is utilized as an antifungal agent as well as a penetration enhancer.

Essential oil used as penetration enhancer

Essential oil obtained from natural source which widely used as penetration enhancer in pharmaceutical and cosmetic preparation in pharmaceutical industry. It volatile in nature get penetrated STRATUM CORNEUM after applied on skin by the mechanism of diffusion.

Table 01: Different types of essential oil.

Essential oil	Chemical components	Source	Application
Eucalyptus oil	Cineole	***Eucalyptus globules.***	Antifungal /antimicrobial
Cinnamon bark oil	Cinnamaldehyde, phellandrene, cuminaldehyde	***Cinnamonium zeylanicium nees.***	Antifungal /antiseptic/stomachic
Angelica oil	Eugenol, 3-methylenecycloheptene	***Angelica archangelica***	Antimicrobial antioxidant penetration enhancer
Fennel, citronella, mentha oils	Volatile oil, protein Menthol	***Foeniculum Vulgare*** ***Menthe piperita***	Flavouring Skin penetrition enhancer

Terpenes

Terpene' is a term used to describe a compound that is a constituent of an essential oil that does not have an aromatic character and contains carbon and hydrogen atoms with/without oxygen. In some circumstances, this word is also used to describe molecules that are structurally similar to natural terpenes but are not of natural origin.[7,-8] Terpenes are well-known penetration enhancers for drug permeation across the human skin, and they have sparked significant interest in the pharmaceutical sector for this purpose.[9-10] They are generally clinically acceptable and moderately safe skin penetration enhancers for both lipophilic and hydrophilic.

Table 02: Classification of terpenes.

Class	No of isoprene unite	No of carbon atoms
Monoterpenes	2	C10
Sesquiterpenes	3	C15
Diterpenes	4	C20
Sesterterpenes	5	C25
Triterpenes	6	C30
Tetraterpenes	8	C40
Polyterpenes	>8	>C40

NEROLIDOL

Nerolidol (3, 7, 11-trimethyl-1, 6, 10-dodecatrien-3-ol) is a naturally occurring sesquiterpene alcohol found in a variety of plants and has a flowery aroma. Physical description: A clear light yellow to yellow liquid with a subtle floral door resembling rose and apple.

EXTRACTION AND SYNTHESIS

Various extraction methods have been used to extract EOs from various plant materials.[2] The hydro distillation method, which uses a Clevenger-type device, appears to be the most

frequent method for extracting nerolidol. Highlights the various extraction methods and yields of nerolidol from various plant components, including leaves, flowers, seeds, fruits, resins, twigs, and wood. In terms of the percentage of nerolidol in the leaf EO among different plants, claussenianum (Miq.) C. DC. Has the highest percentage of trans-nerolidol (81.4%), followed by Zanthoxylum hyemale A.St.-Hil. (51.0%), Zornia brasiliensis Vogel (48.0%), and Swingle glutinous (Blanco) Merr. (28.4%).

ANTIBACTERIAL AND ANTIFUNGAL ACTIVITY

The investigations demonstrated that nerolidol had significant antibacterial action against Staphylococcus aureus FDA 209P, 14 strains of methicillin-susceptible S. aureus (MSSA), and 20 strains of methicillin-resistant S. aureus (MRSA) with MIC values ranging from 512 to more than 1024 µg/Ml.[76] Furthermore, nerolidol demonstrated antibacterial action against numerous strains of Staphylococcus aureus, including MRSA, by breaking cell membranes, as seen by increased leaking of K+ ions from bacterial cells.34 there is ample data to support the efficacy of nerolidol in anti-fungal activities. Trans-nerolidol, a significant component of the leaf EO of Piper claussenianum (Miq.) C. DC., Piperaceae (81.4%), has been reported to demonstrate fungicidal activity against Candida albicans with MIC values measured ranging from 0.24% to 1.26%.

SKIN PERMIABLITY

Nerolidol has been shown to be an effective skin penetration booster. It was discovered to improve the diffusion rate by more than 20 times for transdermal delivery of various medicines, particularly 5-fluorouracil. This significant permeation-enhancing ability was attributed to nerolidol's structure, which allows for alignment within lipid lamellae of the stratum corneum in order to disrupt stratum corneum organization. Prasanthi and Lakshm have also expressed support

DRUG PROFILE

Cassia fistula Linn

Fig. *03: Cassia leaves.*

- **Synonym:** bahava, golden shower tree.
- **Biological source:** it dried or fresh leaves of plant ***cassia fistula Linn.***
- **Family:** ***leguminocea***
- **Chemical constituents:** steroids, alkaloids, glycosides, tannin, saponin, terpenoids, anthraquinones, flavonoids, and derivatives of flavonol
- **Uses:** anti-oxidant function Antioxidants is substances that counteract free radical damage and lower the likelihood of diseases.[29] Gram-positive, Gram-negative, and fungal strains were used to investigate the antibacterial and antifungal properties of hydro alcohol extracts of C. fistula leaves. The results demonstrated a considerable reduction of bacterial growth against the examined pathogens.[30]

EXPERIMENTATION

METHOD

Collection and extraction of crude drug (API)

The leaves of ***cassia fistula Linn***.Were collected in panchavatee nursery Nashik 422010 at early morning. Remove all debris to wash using water and dry in sundrying. The dry leaves are powdered using blender and passing through sieve no 20. Ann accurately weight in quantity of leave powder (100g). Was filled into extractor soxhlet extraction assembly and was extracted by using solvent 90% ethanol, the extraction was continue still dark green extract obtain (4hr) to evaporating solvent and dry extraction and filled into containers.

Fig. 04: Powder drug.

Fig. 05: Cleaning of drug.

METHOD OF FORMULAION

- **Preparation of oil phase:** All ingredients, including sterile alcohol, cetyle alcohol, and white bees wax, were melted in a stainless steel container. Liquid paraffin is added to these mixtures and allowed to melt. After then, the temperature was maintained between 65 and 700 c.

- **Preparation of aqueous phase:-** Water are heated to 60 to 700 c. to these aqueous medium add pre-weighted ingredient like propylene glycol, methyl paraben, propyl paraben was added. Temprature maintain 60 to 700 c.
- **Development of Cream formulation:-** At 65 to 70°C, the total oil phase was then gradually poured into the aqueous phase and stirred for ten to fifteen minutes. The aqueous phase was gradually added to the oil phase with moderate agitation once the temperatures of the two media were equal. The mixture was then agitated until the temperature dropped to 40°C. After cooling to room temperature, the o/w emulsion was transformed into a thick cream base. More reagent peppermint oil was added at the very end, transferred right away to a container, and sealed tightly.[28]

Fig. 06: Development of cream.

Table 03: Master Formula.

Ingredient	Quantity	Used of ingredient
Cassia fistula Lin	100 mg/ml	Antifungal agent
White beeswax	1.5%	Thickening agent
Cetyl alcohol	6.5%	Binding agent
Liquid paraffin	5%	Moisturizer
Nerolidol	2.5%	Penetration enhancer
Propylene glycol 400	5%	Humectants
Methyl paraben	0.001%	Preservative
Propyl paraben	0.002%	Preservative
Span 80	0.3%	Emulsifying agent oil phase
Tween 80	0.3%	Emulsifying agent water phase
Eucalyptus oil	Qs	Antifungal / penetration enhancer
Perfumes	Qs	Fragrance
Water	Upto100ml	Solvent base

Evaluation Paramerters

An examination of body organoleptic charecteristics like colour, odour, stature, etc is involved. The created herbal antifungal cream was examined visually to assess their consistency, colour, look, and odour. Each herbal antifungal cream's pH was determined using a pH meter that had been recalibrated with standard buffer solutions at pH 4, 7, and 9. The cream was infused with the pH meter electrode ten minutes prior to the room temperature reading. A topical preparation's normal pH should fall between 4.5 and 6.5, which is the pH range that corresponds to the skin's pH.11

1. Homogeneity

All the topical cream was individually tested for the homogeneity by visual appearance or by applies on skin or physical touch.

2. Viscosity

The viscosity of formulated creams was measured by Brook field Viscometer NDJ-8S using spindle S 94 at varying speed at 50 rpm at room temperature and shear rates12

3. Spredability

A wooden block attached at one end by a pulley was the equipment created by Muttimer to calculate the spreadability property of a formulation. On this block, a ground glass in the shape of a rectangle was placed. On this ground plate, an excess of the cream under investigation (about 3–4 grams) was put. Next, a glass plate with the same dimensions as the fixed ground plate was placed between this plate and the herbal antifungal cream, which was fastened with a hook. In order to release all trapped air and generate a consistent coating of cream between the plates, a fixed 1 kg load was applied on the upper of the plates for roughly 4-5 minutes. The cream's excess was scraped off. From their limits. After that, an 80 gram drag was applied to the top plate. With the use of a thread attached to the hook, record how long it takes the top plate to travel 10 cm in seconds. Better Spredability is indicated by a smaller interval. Spredability is expressed in gm. Cm/sec.

The following equation can be used to determine the cream's spredability

M x L/T = S

Where, L= length travelled through a glass slide

T= time in sec

M=Pan Weight

S= Spredability

4. Removal

Easy to remove cream after application. It's non sticky in nature.

5. Stability study

The stability research followed ICH guidelines. Stability testing serves as evidence of how the quality of a medicine's constituent or drug product changes over time in response to changes in light, humidity, and temperature, among other environmental factors. For six months, stability tests were conducted on the optimized formulation under two conditions: 25 + 2 °C and 60 + 5% RH, and 40 + 2 °C and 75% RH. The sample's colour, physical characteristics, and pH were examined at intervals of 0, 3, and 6 months.

6. Skin irritancy test

Skin irritancy is determined with that herbal antifungal cream formulations do not affect the human skin cells or tissues. Irritancy may result in swelling, redness and inflammation on the surface of skin when some particular creams are applied without testing.

RESULT AND DISCUSSION

1. Collection and extraction of drug

The leaves of ***Cassia fistula Linn***. We were picked up early in the morning from Panchavati Nursery in Nashik 422010.

Cassia fistula Linn extraction. The Soxhlet extraction process was used in sequential steps. Solvent used was 99% ethanol.

Fig. 07: Soxhlet Extraction.

Table 04: Detailed of extract.

Sr.no	Solvent	Colour of extract	Consistency	% yield
1	Ethanol	Dark green	Semisolid	29%

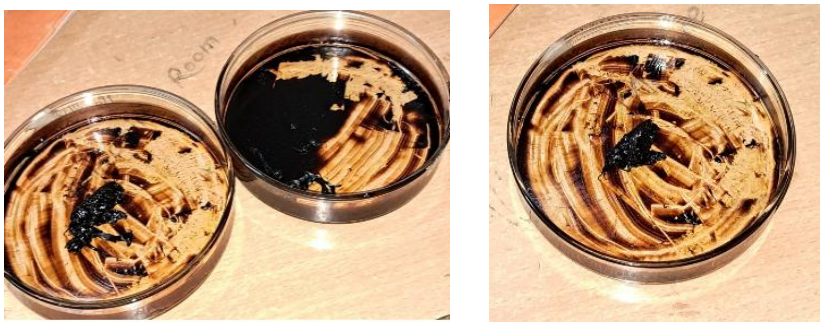

Fig. 08: Obtain extract of Cassia.

2. In vitro Antifungal activity of extract

When the antibacterial activity of Cassia fistula was tested, it revealed a notable level of activity. Table No. 6 has the tabular details of this. Sample C (100 mg/ml) demonstrated extremely significant antimicrobial activity against candida albicans and moderate inhibitory action against sample E (10 mg/ml), according to the steady state results. As a result, every sample exhibited the ability to suppress the growth of all candida albicans. A dosage of 100 mg/ml of the medication was utilized in the creation of an antifungal cream that's effective.

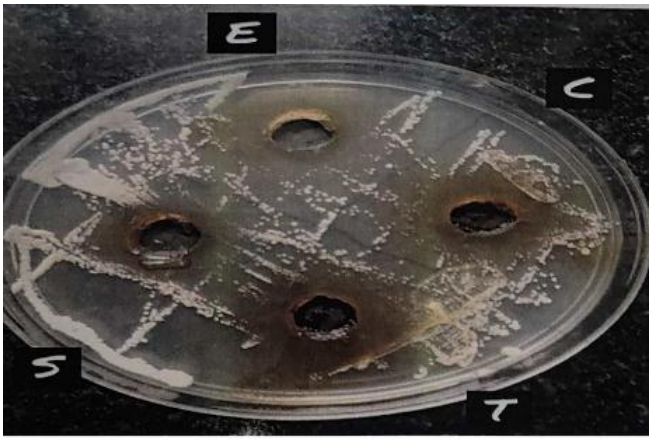

Fig. 09: Antimicrobial activity of cassia extract.

Table 05: Antimicrobial activity of cassia.

Sample code	Concentration	Zone inhibition
E	10 mg/ml	9 mm
S	15 mg/ml	10 mm
T	50 mg/ml	22 mm
C	100 mg/ml	25 mm
Standard	Itraconazole	30 mm

Table 06: Evaluation parameter.

Sr. No.	Evaluation Parameter	Result
1	Appearance / colour	Greenish brown
2	Ph.	5.9
3	Viscosity	6754 cps
4	Spreadabiity	Good
5	Homogeneity	Uniform
6	After feel	Emollient

CONCLUTION

The herbal antifungal and essential oils' fungicidal and fungi static properties, the expanding body of research on their mechanisms of action, and our understanding of both their traditional and novel applications highlight the wide range of potential uses for these natural substances in human medicine, agriculture, food technology, and the decrease of synthetic drug and additive use. The usage of herbal antifungal and essential oils aligns with the hunt for natural compounds that are safe for the environment and human health, even though further research is required. The herbal drug as antifungal, antitoxic, and antibiofilm qualities can operate as a link between their conventional use and their sensible application in complementary therapies. And many current medications must be administered via injection, which is uncomfortable and undesired since it can be dangerous in some situations.

The application of permission enhancer to improve or simply absorption of drug through the skin has been demonstrated by extensive research being conducted in this area. The one disadvantage of penetration enhancers is their propensity to cause skin irritation and unwanted.

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