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"Hydrogel Containing Fluconazole: Preparation and Assessment for Antifungal Properties"

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ABSTRACT
A fungal infection is any sickness or condition produced by a fungal organism. They can infect your lungs or other parts of your body. Superficial fungal infections affect your nails, skin, and mucous membranes (such as your mouth, throat, or vagina). A hydrogel is a biphasic material composed of permeable and porous solids, with at least 10% of the weight or volume of the interstitial fluid consisting totally or largely of water. Fluconazole is an antifungal agent used to treat a variety of fungal infections. This comprises candidiasis, blastomycosis, coccidioidomycosis, cryptococcosis, histoplasmosis, dermatophytosis, and tinea versicolor. An in-vitro drug release study was carried out using Franz's diffusioncell(dolphin)and eggmembrane. An eggmembrane was stored in a phosphatebuffer (pH 6.8) for 24 hrs before use.

Keywords: Blastomycosis, Coccidioidomycosis, Cryptococcosis, Histoplasmosis, Dermatophytosis, Fluconazole.

I. INTRODUCTION

Drugs have been delivered to the human body in several methods during the last few decades, including oral, sublingual, rectal, parental, topical, and inhalation. Topical delivery refers to the direct application of a drug-containing formulation to the skin to treat cutaneous diseases (such as acne) or the cutaneous symptoms of a general disease (such as psoriasis), hence limiting the drug's internal or pharmacological effects on the skin surface. Although foams, sprays, medicated powders, solutions, and even medicated adhesive systems are in use, semi-solid formulations in all their forms dominate the topical delivery method.

1.1 Fungal infections

A fungal infection is any sickness or condition produced by a fungal organism. They can infect your lungs or other parts of your body, although they usually target your skin, hair, nails, or mucous membranes. Fungal infections are more likely to affect those with impaired immune systems. Antifungal medications are commonly used to treat fungal infections.

- **Superficialfungal Infections**

Superficial fungal infections affect your nails, skin, and mucous membranes (such as your mouth, throat, or vagina). The following are examples of superficial fungal infections.

Ringworm (dermatophytosis). Ringworm is caused by a type of fungi called Dermatophytes,which consume cells from the skin, hair, and nails. Tinea infections can affect several parts of the body, including the hands (tinea manuum), scalp (tinea capitis), feet (tinea pedis/athlete's foot), groin and inner thighs (tinea cruris/jock itch), facial hair and surrounding skin (tinea barbae), and other regions.

Onychomycosis Onychomycosis is a fungal condition that affects fingernails and toenails.This may lead to cracked and discoloured nails. Diabetization. Candida albicans is the most common cause of Candida infections of the skin and mucous membranes, often known as mucocutaneous candidiasis.

Deeporinvasivefungalinfectionsinclude:

Histoplasmosis. Histoplasma, the fungus that causes histoplasmosis, can infect your lungs, brain, and other organs. It is most typically seen in the Ohio and Mississippi River valleys.

Coccidioidomycosis (Valley Fever). Coccidioidomycosis is caused by the fungus Coccidioides and can infect your lungs and, on rare occasions, spread to other regions of your body. It is particularly prevalent in California and Arizona.

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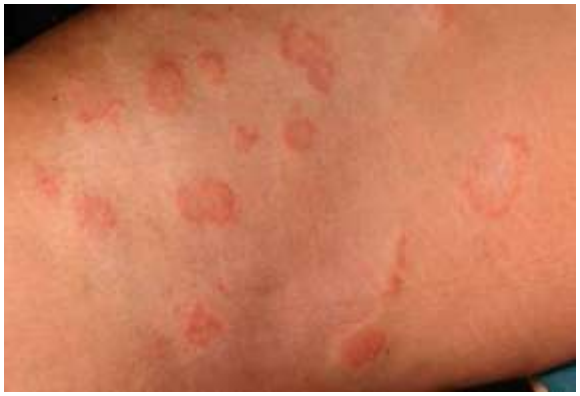

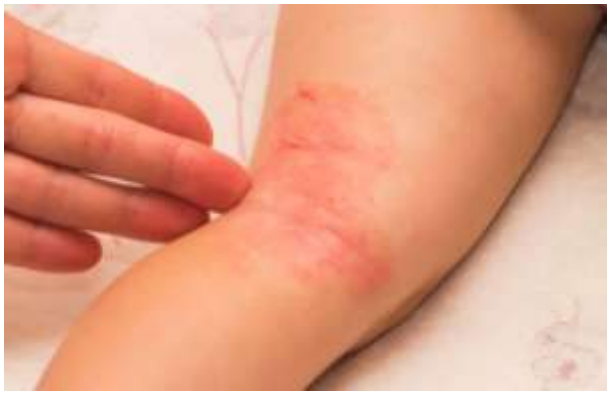

1.3 Hydrogel

A hydrogel is a biphasic material composed of permeable and porous solids, with at least 10% of the weight or volume of the interstitial fluid consisting totally or largely of water. The porous, permeable solid in hydrogels is a three-dimensional network of natural or synthetic polymers that are insoluble in water and have absorbed a large volume of biological or water-based fluids. These characteristics lend themselves to a wide range of applications, notably in biology. While most hydrogels are synthetic, some are naturally occurring. The term 'hydrogel' was first used in 1894.

Sheetsforcookingareahydrogel.

Fig.Peptidehydrogelformationshownbytheinvertedvialmethod.

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Hydrogelsareclassifiedintovarioustypesbasedontheir composition,structure,and properties.
Here are some common types of hydrogels:

NaturalHydrogels:
1. Gelatinhydrogel
2. Collagenhydrogel
3. Hyaluronicacidhydrogel
4. Alginatehydrogel
5. Chitosanhydrogel

SyntheticHydrogels:
1. Polyacrylamide(PAAm)hydrogel
2. Polyethyleneoxide(PEO)hydrogel
3. Polyvinylpyrrolidone(PVP)hydrogel
4. Polyacrylicacid(PAA)hydrogel
5. Polyethyleneglycol(PEG)hydrogel

HybridHydrogels:
1. Natural-syntheticchybridhydrogels
2. Interpenetratingnetwork(IPN)hydrogels
3. Semi-interpenetratingnetwork(SIPN)hydrogels

Stimuli-ResponsiveHydrogels:
1. pH-responsivehydrogels
2. Temperature-responsivehydrogels
3. Light-responsivehydrogels
4. Electricfield-responsivehydrogels

BiodegradableHydrogels:
1. Poly(lactic-co-glycolicacid)(PLGA)hydrogel
2. Poly(lacticacid)(PLA)hydrogel
3. Poly(caprolactone)(PCL)hydrogel

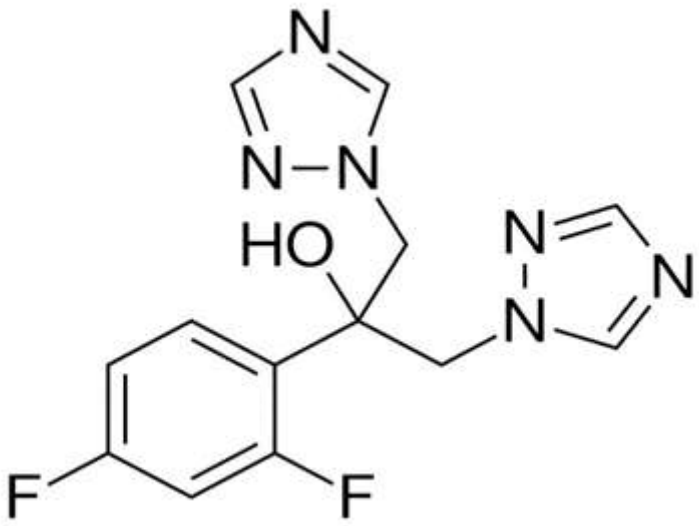
InjectableHydrogels:
1. Insitu-forminghydrogels
2. Thermoresponsivehydrogels
3. Photo-cross linkablehydrogels

1.4 Fluconazole

Fluconazole is an antifungal agent used to treat a variety of fungal infections. This comprises candidiasis, blastomycosis, coccidioidomycosis, cryptococcosis, histoplasmosis, dermatophytosis, and tinea versicolor. It is also used to prevent candidiasis in high-risk groups, such as those who have had organ transplants, have low birth weight infants, or have low blood neutrophil levels. It is administered either orally or intravenously.

Common adverse effects include vomiting, diarrhoea, dermatitis, and elevated liver enzymes. Serious adverse effects may include liver damage, QT prolongation, and seizures. During pregnancy, it may increase the chance of miscarriage, and high dosages may cause birth abnormalities. Fluconazole belongs to the azole antifungal class of medications. It is thought to act by altering the fungal cellular membrane.

Fluconazole was invented in 1981 and commercialised in 1988. It is on the WHO's list of essential medicines. Fluconazole is available as a generic medicine. In 2021, it was the 165th most often prescribed drug in the United States, with over 3 million prescriptions.



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1.5 Topicaldelivery

Includestwobasictypesof products:

- External topicals are disseminated into cutaneous tissues to treat the afflicted region.
- Internal topicals that are applied to the mucous membrane orally, vaginally or on anorectal tissues for local activity.

Topical medicines are most commonly utilised for localised effects at the point of application due to medication penetration into the underlying layers of skin or mucous membranes. Although some unintentional medication absorption may occur, it is often in subtherapeutic amounts and of small significance.

AdvantagesofTopicalDrugDelivery Systems

- Avoidanceoffirst-passmetabolism.
- Convenientandeasytoapply.
- Avoidtherisksandinconveniencesofintravenous therapyandthevaried conditionsofabsorption,likepHchanges,presenceofenzymes,gastricemptyingtime,etc.
- Achievementofefficacywitha lowertotaldailydosageofthe drug bycontinuousdruginput.
- Avoidsfluctuationindruglevelsinter-andintrapatientvariations.
- Abilitytoeasilyterminatethemedicationswhenneeded.
- Arelativelylargeareaofapplicationincomparison withthe buccalornasalcavity
- Abilitytodeliverdrugsmoreselectivelytoaspecificsite.
- Avoidanceofgastrointestinal incompatibility.
- Providingutilisationofdrugswithshortbiological half-lifeand narrowtherapeutic window.
- Improvingphysiologicalandpharmacological response.
- Improvepatientcompliance.
- Providesuitabilityforself-medication.

DisadvantagesofTopicalDrugDeliverySystems

Skinirritationor contactdermatitismayoccurduetothedrugand/or excipients.

- Poorpermeabilityofsomedrugsthroughtheskin.
- Possibilityofallergenic reactions.
- Canbeusedonlyfordrugsthatrequireverysmallplasmaconcentrationforaction
- Enzymesinthe epidermismaydenaturethe drugs
- Drugsoflargerparticlesizeare noteasytoabsorbthroughtheskin

Permeationthrough skin

Mosttopicalpreparationsaremeanttobeappliedtotheskin.So,basicknowledgeofskinand its physiology, function and biochemistry is very important for designing topicals. The skin is the heaviest single organ of the body, combined with the mucosal lining of the respiratory, digestive and urogenital tracts to form a capsule, which separates the internal body structures from the external environment. ThepH of the skin varies from 4 to 5.6. Sweat and fatty acids secretedfromsebuminfluencethepHoftheskinsurface .Itissuggestedthatthe acidityoftheskin helps in limiting or preventing the growth of pathogens and other organisms.

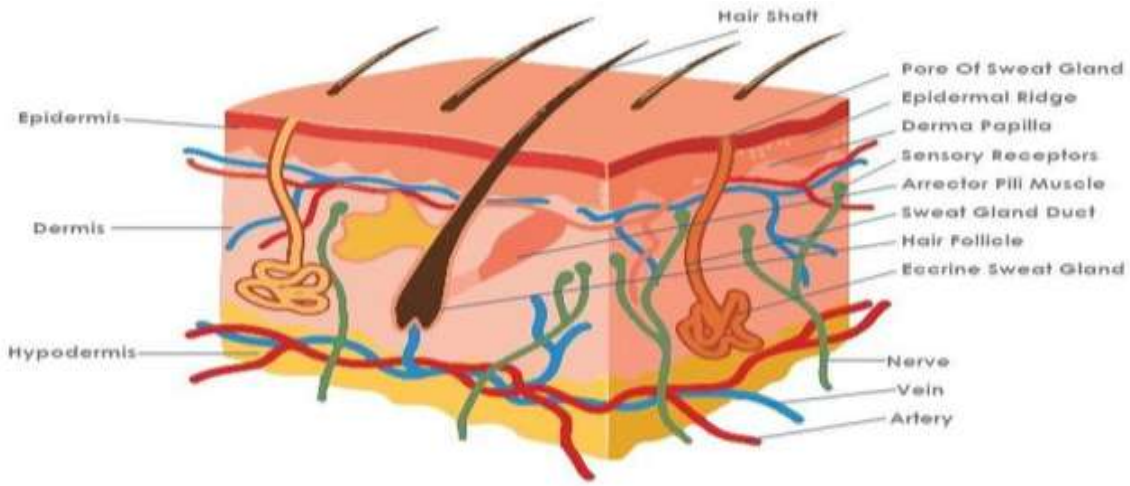

Figure-Cross-sectionofhumanskin

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II. LITERATURE REVIEW

Singh et al. 2023 hydrogel has been extensively explored as a novel vehicle for novel drug delivery systems for the prolonged or delayed action in subcutaneous, ocular, topical, transdermalandparenteralinfusionsofdrugs.Theyare developedtofacilitatethesolubility, bioavailability&stabilityofdrugshavingawiderangeo fapplications(Grampurohitetal. 2009). Hydrogelis a quaternary compound made out of an Oil portion, a Water portion, a surfactant & co-surfactant ().

AnoopKumaretal.(2014)saidhydrogelhas beenregardedasa moreeffectivetopicalvehiclethan its conventional skin applications like cream and gel. Being a transparent and thermodynamically stable system, the hydrogel is formed spontaneously with relative ease of manufacture.Sucha systemhasbetterscale-uppotential,demonstratingtheirindustrialfeasibility as well. These nano-structured vehicles exhibited better solubilisation of the drug and higher skin permeation of the drug in comparison to conventional formulations when applied on the skin. Enhanceddrugsolubilisation,increasedfluxacrossthe skin,and a decreaseindiffusioncoefficientare majorattributesofthe hydrogelsystemowingtothe internalphaseexistingnanosizeddroplet,ultralow interfacial tension with enhanced surface free energy. The present review focuses on different characterisation methods available to establish phase behaviour, type of microemulsion, microstructure details, rheological properties, etc. The effect of formulation components of the microemulsionand trendsinthe selectionofnewexcipientsconstitutingthe oilphase,surfactantandsurfactant have been highlighted herein and future orientations. Hydrogel-basedsystems find significant improvement in topical delivery of antifungal, antiviral, anti-inflammatory, antioxidant, local anaesthetics, etc.

B.NiyazBashaetal.(2011) Fluconazoleisan imidazolederivativeusedforthetreatment oflocalandsystemicfungalinfections.Theorauseofflu conazoleisnotrecommendedas ithasmanysideeffects.Commercially,fluconazoletop icalgelpreparationisnotavailablein the market. Thus, this formulation is made for better patient compliance to reduce the dose of the drug and avoid the side effects of liver damage and kidney damage. The gel was formulated by changing the polymer ratio. FT-IR study confirmed the purity of the drug and revealed no interaction between the drug and excipients. Gel formulations were characterised fordrugcontent,pHdetermination,viscositymeasure ment,in-vitrodiffusion,antifungal

Activity and skin irritation. Among the five formulations, F1 was selected as the best formulationasits%CDRafter4½hwas97.846%,and the releaserateof the drugfrom the formulation isbestfittedto the Higuchimodel.TheviscosityoftheF1formulationwas withinthelimits,and the F1 formulationdidnotshowanyskinirritation.Gelformul ationF1wasfoundtobestableat30

±2°Cand65±5RH.Itwasfoundthatat40±2°C and75±5RH,thegelformulationwasnot stable, and the %CDR was decreased. Efficient delivery of the drug to skin application was found to be highly beneficial in localising the drug to the desired site in the skin and reduced side effects associated with conventional treatment.

JuanPabloetal.(2015) Theincidenceofinva sivefungalinfectionshasincreasedgloballyas a result of several factors. Conventional (sodium deoxycholate) has been used as standard therapy for the treatment of invasive fungal infections; however, it is associated with adverse drug reactions, including acute kidney injury (AKI). New formulations have aimed to improve the safety profile of the conventional formulation. Objectives: This review aimed to assess the effects of deoxycholate versus liposomal on kidney function. Search methods: We searched Cochrane Kidney and Transplant's Specialised Register to 10 March 2015 through contact with the Trials' Search Co-ordinator using search terms relevant to this review. Selection criteria: We included randomised controlled trials (RCTs) that compared sodium deoxycholate with liposomal. Data collection and analysis: Two authors independently assessedstudiesforeligibilityandconducteda riskofbiasevaluation.Mainresults:Weincluded

12 studies (2298 participants) are in this review. Of these, 10 were meta-analysed (2172 participants). Liposomal was found to be significantly safer than conventional in terms of serum creatinine increase (RR 0.49, 95% CI 0.40 to 0.59).

Dubtebdy Sejgar Baget al. (2020) Hydrogels are well-known soft materials that are used to developsoftandwettechnology.A solidcross-linkedpolymerremainsinasolvent-entrapped swollenstate,andthisswollenmassiscalledahydrogel. Hydrogelmaterialshavinghighwater absorption and

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retention capacity are specifically called superabsorbent hydrogels. Such hydrogelsarewidelyusedinbabydiapers,sanitarytowe lsandagriculturalapplications.Many hydrogels exhibit the phenomenon of sudden and reversible phase transitions under the influence of external stimuli such as temperature, pressure, electric and magnetic field, light intensity, pH and ionic strength of the medium and chemical triggers: these are called smart hydrogels(alsostimuli-responsivegelsor intelligenthydrogels).Smarthydrogelshavebeen tailoredtochallengingtechnologicalapplicationssuch asartificialmusclesandorgans,drug delivery systems, smart sensors and actuators. The synthesis of functional smart hydrogels having an extraordinary activity like sensing, healing, actuation, and another function to fulfil the present technological demand for functional soft materials is a challenging task. Syntheses of fast stimuli-responsive and also strong and stretchable hydrogels are two other aspects to consider in the development of smart hydrogels.The present chapter surveys all aspects of hydrogel materials, including their synthesis, characterization, property evaluations, and recent trends in their technological applications.

Vidya Sabale and Sejal Vora (2012) The mechanism of drug release from microemulsion-based hydrogel was observed to follow zero-order kinetics. The studied optimizedmicroemulsion-basedhydrogelshowedgoodstabilityover3months. The average globule size of optimized microemulsion (F5) was found to be 18.98 nm, zeta potential was found to be -5.56 mv, and permeability of drug from microemulsion within 8 h wasobserved84%.Theantifungalactivityofmicroemu lsion-basedhydrogelwasfoundtobe comparable with marketed cream.

Yosif Almoshari et al. (2012) Active pharmaceutical ingredients (API) or drugs are normally notdeliveredaspurechemicalsubstances(forthepreve ntionorthetreatmentofanydiseases). APIs are still generally administered in prepared formulations, also known as dosage forms. Topical administration is widely used to deliver therapeutic agents locally because it is convenient and cost-effective. Since earlier civilizations, several types of topical semi-solid dosageformshavebeencommonlyusedinhealthcareto treatvariousskindiseases.A topical drug delivery system is designed primarily to treat local diseases by applying therapeutic agents to surface level parts of the body such as the skin, eyes, nose, and vaginal cavity. Nowadays, novel semi-solids can be used safely in pediatrics, geriatrics, and pregnant womenwithoutthepossibilityofcausinganyallergicre actions.Thenovelhydrogelsarebeing usedinawiderangeofapplications.Atfirst,numeroush ydrogelresearchstudieswerecarried outbysimplyaddingvariousAPIsinpureformordissol vedinvarioussolventstotheprepared hydrogel base. However, numerous research articles on novel hydrogels have been published in the last five to ten years. It is expected that novel hydrogels will be capable of controlling the APIs' release pattern. Novel hydrogels are made up of novel formulations such as nanoparticles,nanoemulsions,microemulsions,lipos omes,and self-nano-emulsifying drugs. Deliverysystems,cubosomes,andsoon.This reviewfocusesonsomenovelformulations incorporated in the hydrogel prepared with natural and synthetic polymers.

OBJECTIVE

PreparationandevaluationofhydrogelcontainingFluc onazoleforAntifungalProperties

RESEARCHENVISAGEDANDPLANOFWOR K

PLANOF WORK

1) Selectionofdrug
2) Literaturereview
3) Preformulation study
- Identificationstudy
- Solubility study

4) Formulationdevelopmentandoptimisation
5) Characterizationofoptimised formulation
6) In vitro study
7) Stabilitystudy
8) Data Compilation
9) Result-s-s &discussion
10) References

III. EXPERIMENTAL WORK

Preparationofhydrogelforfungalinfection:

Inthispresentwork,thehydrogelwaspreparedwithFlu conazole

Methodofpreparation

Three primary constituents make up the hydrogel. Carbopol 940 and tween 80. Typically, it

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consists of two phases: the oil phase, which is composed of oleic acid and tween 50, and the aqueous phase, which is composed of water and carbopol 940. In other words, the hydrogel is combined with the oil phase, which is composed of oleic acid and tween 80.

To prepare hydrogel, we first take carbopol and let it swell for four hours before continuing with the formulation process. I employed the medication as the active component, carbopol-940 as the gelling agent, and other excipients to make the hydrogel. I started by adding 15 millilitres of oleic acid and 9.5 millilitres of tween 80, stirring constantly at room temperature while spinning at 500 rpm. Ten milligrams of amphotericin B were then added after one hour of constant stirring. After another hour of waiting, add 4 millilitres of water, drop by drop, along with 50 milligrams of fluconazole. After that, they added the carbopol-940, which had swollen during the previous four hours. They left it on a magnetic stirrer for three to four more hours and left it for twenty-four hours to ensure that the gel formed properly and that the fluconazole was ready.

EVALUATIONPARAMETERS

1) **PHYSICALEVALUATION:**Gelswerevisuall ycheckedforcolour,odour, consistency and homogeneity.

2) **pH MEASUREMENT:** The pH of prepared gels was determined using a digital pH meter, whichwascalibratedbeforeeachusewitha standardpHsolution.Eachformulationwas found in an oral cavity pH range (6.8-7.2).

3) **VISCOSITY:**All eight formulated gels' Viscosities were measured using a Brookfield viscometerat100rpmusingspindlenumber64.Vis cositieswererecordedatroomtemperature for all formulations.

4) **SPREADIBILITY:** Two equal-sized glass plates were taken, and about 1 gm of gel was placedintoacircleof1cmdiametermarkedongrap hpaper,whichwasplacedbillowa glass plate,overwhichasecondglassplatewasplaced.A weightof100gmwasallowedtorest on the upperglass plate, and an increase in diameter due to the spreading of the gels was noted. Spreadability was determined using the following formula. S=ML/T

5. **DRUG RELEASE STUDY:** An in-vitro drug release study was carried out using Franz's Diffusioncell(Dolphin)andeggmembrane.Aneg gmembranewasstoredina phosphatebuffer (pH 6.8) for 24 hrs before use. The egg membrane was tied to one end of the donor compartment, the receptor compartment was filled with the phosphate buffer of 6.8 pH, and the temperature was maintainedat37±0.5°Cwithconstantstirring.Igm ofgelwasplacedonadonorcompartment. The Iml samples were collected from the receptor compartment at predetermined time intervals and replaced by an equal volume of phosphate buffer to maintain a sink condition throughout the experiment. The amounts of drugs in the sample were assayed by using a UV-Vis spectrophotometer (Shimadzu-1900) at 210 and 410 nm.

1. Preformulationstudies

Preformulationstudiesare performedbeforethecommencementofformulationde velopment, and the major aim of the study is to

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produce or develop stable, safe, and therapeutically efficacious dosage forms that are mainly related to the characterisation of the physico-chemical properties of the drug molecule.

2. Identificationofdrug

FT-IR spectroscopy method was used for the identification and evaluation of drugs and excipients.DrugKBRpelletswereusedtorecordtheFT-IRspectrumwithaPerkin-Elmer model.

Process–3:-Analysis

Thecontentof fluconazolewasestimatedbythe UVspectrophotometertechnique,whichisbased on themeasurementofabsorbanceatwavelength275nmina phosphatebuffermediumatpH. 7.4.Thetechniquewasvalidatedforitsaccuracyandpre cision.ThemethodobeyedBeer's lawintheconcentrationrange0-25µg/ml.Inobservation(n=6),themeanerror(accuracy)an d relativeS.D.(precision)werefoundtobe 0.6%&1.2%,respectively.

3.1 In-vitrodiffusionstudies

The skin (abdomen) of Swiss albino male mice was taken for diffusion procedures. Mice (30-35g) were anaesthetisedslightlybydiethyl ether,andhairswereremovedfromtheskinofthe mice.Theywere sacrificed, and the abdominal skin of the mice was taken off. After removing the subcutaneous fat, the skin was washed and checked for its integrity. The skin was stored in a refrigerator at 4°C overnight and then used for the evaluation. The diffusion procedures were performed in a diffusion cell with a recirculatingwaterbathwith12diffusioncells.Theskinwasst retchedandfixedbetweenthedonor andthereceptorchamberofdiffusioncells.Thecellhasaneffe ctivediffusionareaof2.8cm^{2}and a 7 mlvolumeof the cell.Thereceptorchamberwasfilledwith a freshlypreparedmixtureofwater-ethanolin theratioof4:1v/vtosolubilisethefluconazole.Thesolutionof 20%ethanolwasusedtosolubilise fluconazole.Thereceptorchamberswerethermostatat3 7°C,andthesolutionin thereceptor chamberswasstirred(continuously)at300rpm.Theformul ation(1.5g)containingfluconazole waskeptinthedonorchamber.Atappropriatetimeinterv als,0.5mlofthesolutionfromthe receptor chamberwasremovedforUVevaluationsandreplacedim mediatelywiththesamevolumeoffresh solutionofethanol(20%).Thecumulativeamountofdrug diffusedthroughmiceskinwasplotted againsttime(Salgadoetal.2010)

3.2 Skinirritationstudies

Asetof8ratswasusedforstudyingskinirritati ontests.TheEmulgelwasappliedontheshaven skin of rats. The undesirable skin changes, i.e., changes in colour, scratches and change in morphology, were determined within 24 hours of application.

	Fluconazole
C. Albicans	++
C. dubliniensis	++
C. tropicalis	++
C. glabrata	+/+
C. Krusei	--
C. parapsilosis	++
C. Guiliermondii	+
C. Lisitaniae	++

Table:Spectrumofactivityforantifungaldrugs

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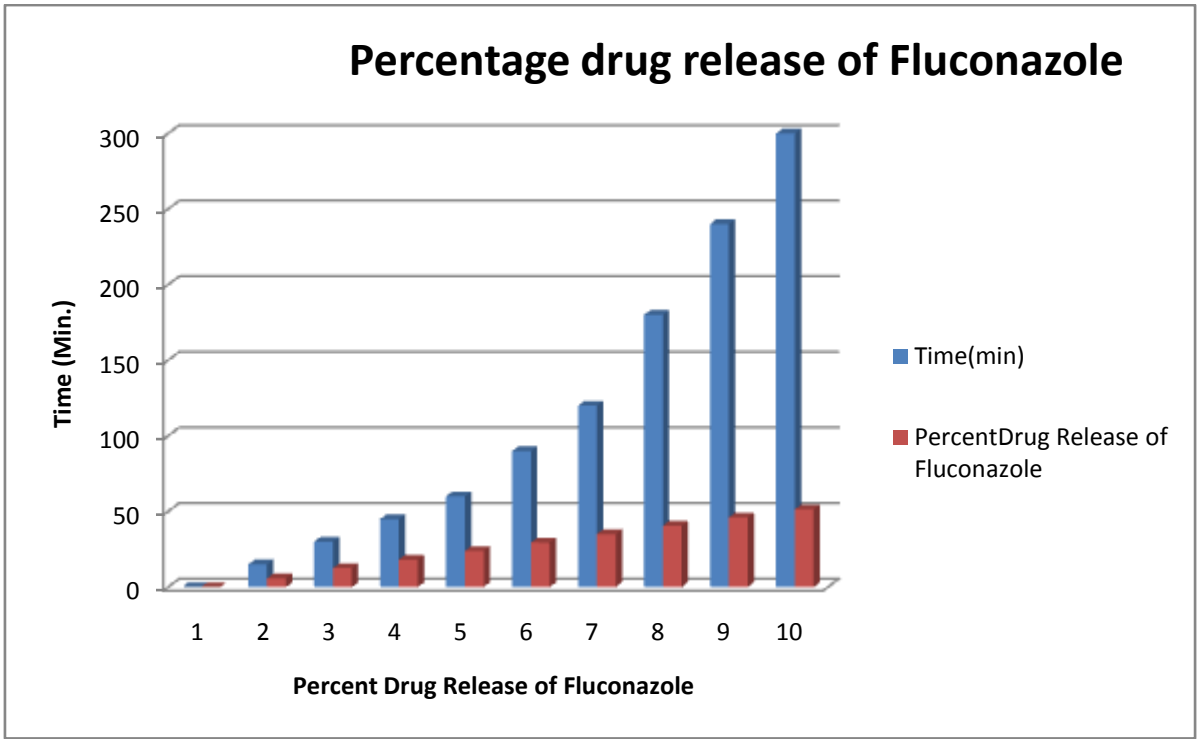

S No.	Time(min)	PercentDrug Release of Fluconazole
1	0	0
2	15	5.71750285
3	30	12.56385405
4	45	18.1559293
5	60	23.89338654
6	90	29.4541049
7	120	35.03762828
8	180	40.54703535
9	240	46.07354618
10	300	51.37725199

IV. RESULTS AND DISCUSSION

Fluconazole was prepared using constituents such as Carbopol 940 and distilled water. Non–ionic surfactants were more convenient to use due to their less toxic and less skin- irritation effects.

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Formulations	Viscosity (CPS)*
ME-1	52.6±0.6
ME-1	75.36±0.8
ME-1	91.4±0.4
ME-1	103.5±0.5
ME-1	118.2±0.2

Table10:Viscositymeasurements.

Mechanicalstressstudy

The following table demonstrates the mechanical stress study of different formulations developed.Thehighest%phaseseparationwasrecordedas10afterexploring60minutes of centrifugation time. The minimum % phase separation was noted as two after 10 exploring 10 minutes of centrifugation time.

V. CONCLUSION

It was possible to manufacture fluconazole using a variety of excipient kinds and ratios. According to the current study, there may be several benefits, including improved transdermal layer action, improved drug solubility, high thermodynamic stability, and simplicity of fabrication. Aside from that, for patients who are unable to take the medication orally, fluconazole may be the most practical and effective topical formulation.

The New Drug Administration System (NDDS), which improves the novel strategy for frequent administration of loaded and fluconazole, is the subject of this study.

It would be a fantastic beginning for allopathic medications to improve millions of people's lives. Additionally, the cost of producing it in large quantities would be acceptable. It will lower the frequency of the same dose.

REFERENCE

[1]. ProrostC.Transparentoil-watergels.Areview.IntJCosmetSci.1986;8(3):233-247.

[2]. Gupta A, Mishra AK, Singh AK, Gupta V, Bansal P. Formulation and evaluation of topical gel of diclofenac sodium using different polymers. Druginvention Today2010;2(5):250-253.

[3]. ProvostC.Transparentoil-watergels.Areview.IntJCosmetSci1986;8(7):233-247.

[4]. RashmiMS.Topicalgel.Areview2008;6(3):244-249.

[5]. Shivhare UD, Jain KB, Mathur VB, Bhusari KP, Roy AA. Formulation development and evaluation of diclofenac sodium gel using water solublepolyacrylamide polymer. Digest J Nanomet andBiostruct. 2009;4(2):285-290.

[6]. Vasileiou E, Apsemidou A, Vyzantiadis TA, Tragiannidis A. Invasive candidiasis and candidemiainpediatricandneonatalpatients: Areviewofcurrentguidelines.CurrMed Mycol. 2018 Sep;4(3):28-33.

[7]. Jansook P, Fülöp Z, Ritthidej GC. loaded solid lipid nanoparticles (SLNs) and nanostructured lipid carrier (NLCs): physicochemical and solid-solution state characterizations. Drug Dev Ind Pharm. 2019 Apr;45(4):560-567.

[8]. UllmannAJ,SanzMA,TramarinA,BarnesRA,WuW,GerlachBA,KrobotKJ,Gerth WC.,LongitudinalEvaluationofAntifungal Drugs(LEADI)Investigators.Prospective study of formulations in immunocompromised patients in 4 European countries. Clin Infect Dis. 2006 Aug 15;43(4):e29-38.

[9]. Hamill RJ. formulations: a comparative review of efficacy and toxicity. Drugs. 2013 Jun;73(9):919-34.

[10]. AlBalushiA,KhamisF,KlaassenCHW,GangneuxJP,VanHellemondJJ,PetersenE. Double Infection WithLeishmania tropica and L. major in an HIV Patient Controlled With High Doses of. Open Forum Infect Dis. 2018 Dec;5(12):ofy323.

[11]. RybakJM,FortwendelJR,RogersPD.Emergingthreatoftriazole-resistantAspergillus fumigatus. J Antimicrob Chemother. 2019 Apr 01;74(4):835-842

[12]. Rang HP, Dale MM, Ritter JM, Moore PK. Pharmacology. 5th ed. Edinburgh, UK: Churchill Livingstone; 2005. p. 666

[13]. MitchelJ.Transdermaldrugdelivery.Americalacademyofdermatology– 58th Annual Meeting, San Francisco, CA. 2000

[14]. PatelV,KukadiyaH,MashruR,SurtiN,MandalS.DevelopmentofmicroemulsionforsolubilityenhancementofclopidogrelIran J Pharm Res. 2010;9:327–34.

[15]. YamaneM,WilliamsA.Effectofterpenesandoleicacidasskinpenetration enhancers. Int J

Pharm. 1995;116:237–51.
[16]. Touitou E, Godin B, Karl Y, Bujanover S, Becker Y. Oleic acid, a skin penetration enhancer, affects Langerhans cells and corneocytes. J Control Release. 2002;80:1–
[17]. KawakamiK.Microemulsionformulationfo renhancedabsorptionofpoorlysoluble drugs. J Control Release. 2002;81:75–82.
[18]. LawrenceaM,GarethD.Microemulsion-basedmediaasnoveldrugdeliverysystems. Adv Drug Deliv Rev. 2000;45:89–121.
[19]. Singh V, Bushettii SS, Raju AS, Ahmad R, Singh M, Bisht A. Microemulsions aspromising delivery systems: A Review. Indian J Pharm Educ Res. 2011;45:392–401.
[20]. FakhreeM.,AhmadianS.DrugDelivery.Nov aSciencePublishers,Inc.;Hauppauge, NY, USA: 2011. Pharmaceutical dosage forms: Past, present, future; pp. 51–89.
[21]. AfrinS.,GuptaV.PharmaceuticalFormulati on.StatPearlsPublishing;Treasure Island, FL, USA: 2020.
[22]. Noordin M.I. Pain Relief-From Analgesics to Alternative Therapies. IntechOpen; London,UK:2017.Advancedeliverysystem dosageformforanalgesic,theirrationale, and specialty.
[23]. SinghMalikD.,MitalN.,KaurG.Topicaldru gdeliverysystems:Apatentreview.
[24]. ExpertOpin.Ther. Pat.2016;26:213–228. doi:10.1517/13543 776.2016.1131267.
[25]. Sharma S., Singh S. Dermatological preparations, formulation and evaluation of various semi-solid dosage form. Asian J. Pharm. Res. Dev. 2014;2:10–25.
[26]. Panwar A., Upadhyay N., Bairagi M., Gujar S., Darwhekar G., Jain D. Emulgel: A review. Asian J. Pharm. Life Sci. 2011;2231:4423.
[27]. Ilić T., Pantelić I., Savić S. The implications of regulatory framework for topical semisolid drug products: From critical quality and performance attributes towards establishingbioequivalence.Pharmaceutics. 2021;13:710.doi:10.3390/pharmaceutic s13050710.
[28]. BoraA.,DeshmukhS.,SwainK.Recentadva ncesinsemisoliddosageform.Int.J. Pharm. Sci. Res. 2014;5:3594–3608.
[29]. SharadhaM.,GowdaD.,GuptaV.,AkhilaA. Anoverviewontopicaldrugdelivery system–updated review. Int. J. Res. Pharm. Sci. 2020;11:368–385. doi: 10.26452/ijrps.v11i1.1831.
[30]. YuY.-Q.,YangX.,WuX.-F.,FanY.-B.EnhancingPermeationofDrugMolecules Across the Skin via Delivery in Nanocarriers: Novel Strategies for Effective Transdermal Applications. Front. Bioeng. Biotechnol. 2021;9:646554. doi: 10.3389/fbioe.2021.646554.
[31]. Ajay Kumar, Rahul Sharma, & Jagdish Chandra Rathi. (2021). Development and Evaluation of Gastro-Retentive Floating Beads of Simvastatin. World Journal of Pharmaceutical Research, 10, 1337–1344.
[32]. Abhay Kushwaha, Shailesh Jain, Ajay Kumar, Ritesh Raj, Phool Singh Yaduwanshi, & Dhanraj Patidar. (2025). An Overall Review of Different Derivatives That Activate Glucokinase Enzyme Having Multiple Actions to Treat Type 2 Diabetes. International Journal of Pharmaceutical Research and Applications, 10(1), 358–367. https://doi.org/10.35629/4494-1001358367.
[33]. Shantanu Namdev, Shailesh Jain, Dhanraj Patidar, Ajay Kumar, & Ritesh Raj. (2025). Recent Advances in Pharmaceutical Formulations for theTreatment of Various Diseases: a Review. International Journal of Pharmaceutical Research and Applications, 10(1), 389–394. https://doi.org/10.35629/4494-1001389394.
[34]. Shivam Kumar Shukl, Shubham Kumar, Dhanraj Patidar, Shailesh Jain, Ajay Kumar, & Ritesh Raj. (2025). Improvement of Aqueous solubility of Poorly Water-Soluble Drug (Ibuprofen) Using Mixed Solvency Technique. International Journal of Pharmaceutical Research and Applications, 10(1), 407–416. https://doi.org/10.35629/4494-1001407416.