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Original Research Article

FORMULATION, DEVELOPMENT AND EVALUATION OF LULICONAZOE ORGANOGEL

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Abstract

The main aim of this study was to develop a topical drug delivery (Organogel) of Luliconazole to reduce the dose of the active drug, to improve patient compliance, to avoid the side effects and increase local onset absorption and action. Luliconazole is an optically active imidazole antifungal agent. It has been found to have broad-spectrum of antifungal activity against pathogenic fungi, especially dermatophytes. **Methods:** Topical Organogel formulations of Luliconazole were prepared using span-60 with different penetration enhancer with their different concentrations. Six different formulations of Luliconazole were prepared and evaluated with respect to their colour, Spreadability, viscosity parameter, determination of pH, drug content, in vitro drug release studies, zeta potential studies, and stability studies. **Results:** FT-IR study revealed that there were no any significant interaction between the drug, excipients and polymers. All the designed formulations of Luliconazole show acceptable standard physical properties. The drug content and percentage yield were higher for F2 formulation among all formulation F2 shows better drug release. Stability study of the best formulation F2 (Coconut oil) shows that there was no difference in drug content and in vitro drug release studies. **Conclusion:** From the above observation results that this F2 formulation (Coconut oil) may be more encouraging topical substitute for the healing of fungal infections in the skin.

Keywords: Luliconazole, Organogel, Zeta potential, Stability study

INTRODUCTION

A gel may be a two-component, cross-linked three-dimensional network consisting of structural materials interspersed by an adequate but proportionally large amount of liquid to make an infinite rigid network structure which immobilizes the liquid continuous phase within. The structural materials that form the gel network are often composed of inorganic particles or organic macromolecules, primarily polymers. Cross links are often formed via chemical or physical interactions. This results in gel classification into chemical and physical gel systems, respectively. Luliconazole is an optically active imidazole antifungal agent. It has been found to have broad-spectrum of antifungal activity against pathogenic fungi, especially dermatophytes. As ergosterol is an essential component of the fungal cell

membrane, inhibition of its synthesis results in the increased cellular permeability causing leakage of cellular contents responsible for cell death. [1-6]

CLASSIFICATION OF GELS:

Gels may be classified supported colloidal phases, nature of solvent used, physical nature and rheological properties.

1. Based on nature of solvent

Hydro gels (water based)
Here they contain water as their continuous liquid phase E.g. bentonite, derivatives of cellulose, carpooler, and synthetic poloxamer gel. Example- plastibase (low molecular wt. polyethylene dissolved in oil) Olag (aerosol) gel and dispersion of metallic stearate in oils.

Organogel

An organogel, is a semisolid formulation of gel dosage forms, which has an immobilized external apolar phase. The apolar phase is immobilized within spaces of the 3D network structure formed due to the physical interactions amongst all polymers the self-assembling structures of compounds regarded as gelators.[8-10]

Xerogels

Solid gels with low solvent concentration are called xerogels. These are produced by evaporation of solvent or freeze drying, leaving the gel framework behind on contact with fresh fluid, they swells and may be reconstituted. E.g. Tragacanth ribbons, acacia tear β1-cyclodextrin, dry cellulose and polystyrene.[11-13]

2. Based on colloidal phases

They're classified into Inorganic (two phase system) kind of force that's accountable for the linkages determine the structure of the network and therefore the properties of the gel.[14-17]
Single-phase system these contain large organic molecules existing on the twisted strands dissolved during a continuous phase.

3. Based on rheological properties

Usually, the gels show non-Newtonian flow properties. They're classified into, a) Plastic gels b) Pseudo plastic gels c) Thixotropic gels. (a) Plastic gels E.g. - Bingham bodies, flocculated suspensions of aluminium hydroxide exhibit a plastic flow and the plot of rheogram gives the yield value of the gels above which the elastic gel distorts and begins to flow. (b) Pseudo-plastic gels E.g. - Liquid tragacanth dispersion, sodium alginate, Na Carboxy methyl cellulose etc. exhibits pseudo-plastic flow.[18-19]

4. Based on physical nature

(a) Elastic gels Gels of agar, pectin, guar gum and alginates exhibit an elastic behavior. The fibrous molecules being linked at the purpose of junction by relatively weak bonds like hydrogen bonds and dipole attraction. E.g.: Alginate and Carbapol. (b) Rigid gels this may be formed from macromolecule within which the framework linked by primary valance bond. E.g.: In colloid, silic acid molecules are held by Si-O-Si-O bond to provide a polymer structure possessing a network of pores.

PREPARATION OF GELS:

Gels are generally prepared at the industrial scale under room temperature. However, few of polymers such-Synthetic and Natural need special treatment before processing. Gels are also prepared by following methods.[20]

1. Thermal changes
2. Flocculation
3. Chemical process/ reaction

MATERIALS AND METHODS

Luliconazole was received gift sample from FDC Ltd, Mumbai, India. All Other Chemicals used in the formulation development were of the standard analytical grade. Luliconazole formulations organogel were prepared by using penetration enhancer (Coconut Oil and Almond Oil) are dispersed in distilled

water with constant stirring by magnetic stirrer at a medium pace maintaining the temperature at 30^0C. Gels are packed in a wide mouthed glass jar, and it is covered with screw copped plastic lid after covering with aluminium foil. Various preparations of Luliconazole topical gel are shown in Table 1. They were kept in the dark and cool place. Evaluation of physicochemical parameters of prepared Luliconazole gel Drug-excipients compatibility studies Fourier transfer infrared spectrophotometer (FTIR). The drug, polymer, and excipients interactions are studied using the FTIR method. In general, drug and excipients must be coinciding with each other which produce a stable, safe, and efficacious product. IR spectral analysis of pure drug and polymers carried out. Pure drug that gives peak and patterns were compared with the peaks and patterns with the combination of polymer and drug.

RESULTS AND DISCUSSION

Drug-excipients compatibility studies

The IR studies of clear Luliconazole formulation comprises greater proportion of the polymers that are conducted to know about the bond between the used polymers and the drug.

The IR spectrum of pure Luliconazole and Luliconazole gel formulations that used greater proportion of polymer that gives comparable basic patterns and peaks. Outcome status that no notable drug and polymer interactions.

Visual inspection

Visual determination is done to examine the physical properties and color of the developed formulation.

Determination of pH the pH value of all developed gel was in the range of 6.6–7.1. This is sufficient for appealing to skin and avoid the chances of irritation.

Spreadability

The study has a few major elements that show the gel character that emerges out from the tube. Spreadability test is carried for all the formulations.

Determination of drug content

The drug content of the formulated gel was estimated. The drug content manifests that the drug was distributed equally throughout the gel.

Percentage yield and viscosity

Percentage yield of a topical gel consisting of Luliconazole was in the range of 95.10–98.50%. This was identified that the percentage yield of F2 formulation showed an increase in percentage yield than the other preparation due to use of coconut oil as penetration enhancer.

In vitro drug release

The drug release profile of Luliconazole topical gel formulations was accomplished by diffusion cell. As an outcome of the *in vitro* release studies of all formulations are given in Table 3, and the statistically represented is shown in Figure

DISCUSSION

The imidazole derivative of Luliconazole is one of the best drugs used for the treatment of fungal infections. In this study, the topical gel preparation of Luliconazole was formulated for efficient that absorption of the drug across the skin. Advanced formulations of Luliconazole were analyzed for physiochemical parameters such as viscosity, Spreadability, drug content, and *in vitro* drug release studies.

CONCLUSION

By analysing the above results, concluded that our drug Luliconazole was incorporated with success into the topical gel development among all the designed formulation, the formulation F2 shows better Spreadability, drug content, viscosity, and drug release studies. Therefore, this was concluded that our formulation would be very effective and safe topical alternative for the treatment of skin fungal infections.

Table 1: Luliconazole Formulation

Ingredients (Gm)	F1	F2	F3	F4	F5	F6
Luliconazole	2	2	2	2	2	2
DMSO	5	5	5	5	5	5
Span-60	10	10	10	10	10	10
Coconut Oil	80	80	80	-	-	-
Lemon Oil	-	-	-	80	80	80
Propyll Galate	1	1	1	1	1	1
Methyl Paraben	2	2	2	2	2	2
Propyl Paraben	0.5	0.5	0.5	0.5	0.5	0.5
Total	**≈100**	**≈100**	**≈100**	**≈100**	**≈100**	**≈100**

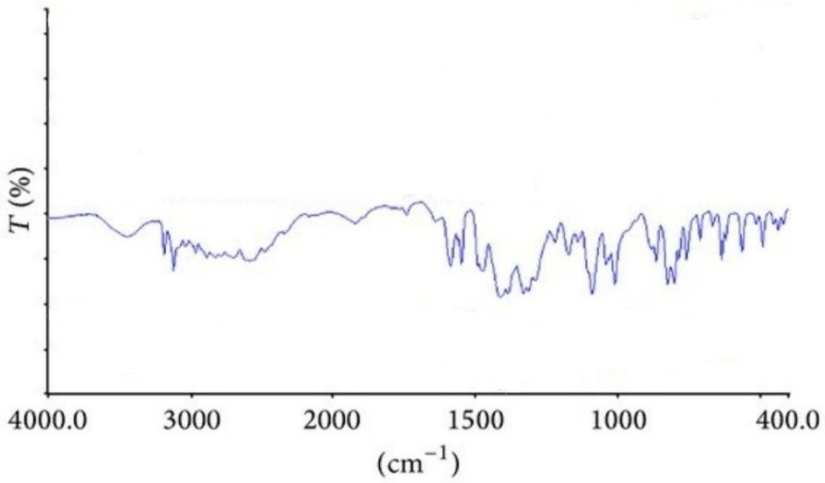
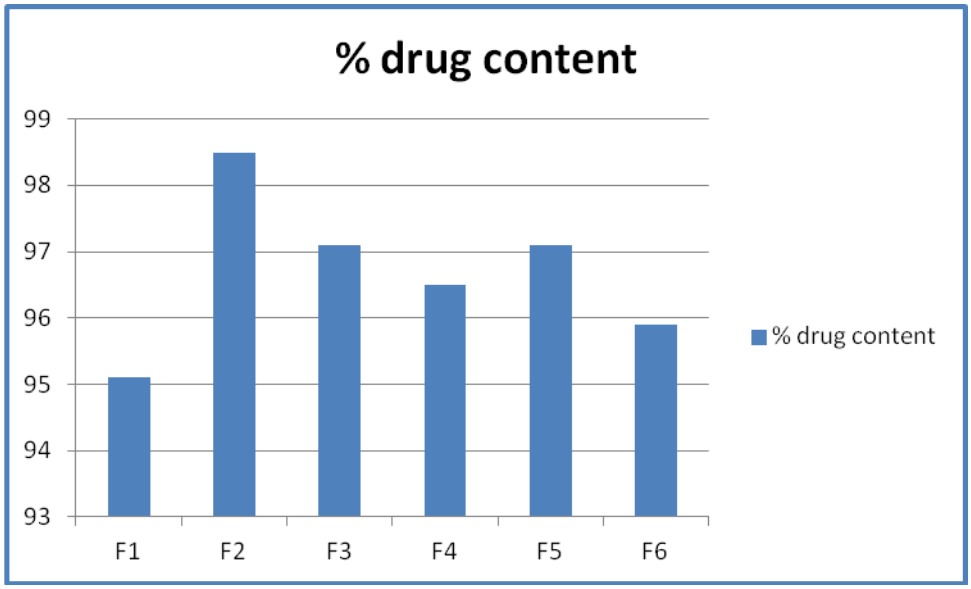


Figure: IR Spectra of Luliconazole

Table 2: Characterization of formulation of Luliconazole Gel

Characterization	Formulation code					
	F1	F2	F3	F4	F5	F6
pH	7.1	7.0	6.9	7.4	7.3	6.8
Viscosity	75	98	105	141	152	168
Gelling capacity	+++	+++++	++++	+++	+++	++
Content uniformity	95.10 ±0.01	98.50 ±0.02	97.10 ±0.01	96.50 ±0.02	97.10 ±0.0 1	95.90 ±0.03



REFERENCE:

1. Sharma AK el al. pharmaceutical gel: A review, International Journal of Pharmacy & Technology, Dec. 2020. 12(4), 7223-7233.
2. Agrawal D, Goyal R, Bansal M, Sharma AK, Khandelwal M, Development and Evaluation of Econazole Organogel; International Journal of Current Pharmaceutical Review and Research., 13(2), Pages: 15-23.
3. Niwano Y, Ohmi T, Seo A, Kodama H, Koga H, Sakai A. Lanoconazole and its related optically active compound nnd-502: novel anti-fungal imidazoles with a ketene dithioacetal structure. Curr Med Chem. 2003; 2:147–160.
4. Niwano Y, Kuzuhara N, Kodama H, Yoshida M, Miyazaki T, Yamaguchi H. In vitro and in vivo antidermatophyte activities of NND-502, a novel optically active imidazole antimycotic agent. Antimicrob Agents Chemother. 1998; 42:967–970
5. Draelos ZD, Vlahovic TC, Gold MH, Parish LC, Korotzer A. A Randomized, Double-blind, Vehicle-controlled Trial of Luliconazole Cream 1% in the Treatment of Interdigital TineaPedis. J Clin Aesthet Dermatol. 2014;7(10):20-27.
6. Michaels AS, Chandrasekaran SK, Shaw JE. Drug permeation through human skin: theory and *in vitro* experimental measurement. AIChE J 1975; 21:985–96.
7. Prausnitz MR, Langer R. Transdermal drug delivery. Nat Biotechnol 2008; 26:1261–8.
8. Dhiman S, Singh GT, Rehni AK. Transdermal patches: a recent approach to new drug delivery system. Int J Pharm Pharm Sci 2011; 3:26–34.
9. Tan X, Feldman SR, Chang J. Topical drug delivery systems in dermatology: a review of patient adherence issues. Expert OpinDrug Delivery 2012; 9:1263–71.
10. Mcauley WJ, Caserta F, Hoboken NJ. Film-forming and heated systems. In: Donnelly RF, Singh TRR. editors. Novel delivery systems for transdermal and intradermal drug delivery. United States: John Wiley and Sons; 2015. p. 97–107.
11. Frederiksen K, Guy RH, Petersson K. The potential of polymeric film-

forming systems as sustained delivery platforms for topical drugs. Expert Opin Drug Delivery 2015; 13:349–60.
12. B.V. Mikari, K.R.Mahadik, Formulation and evaluation of topical liposomal gel for fluconazole. S.A. Korde, Indian J .Pharm.Sci., 2010. 44(4), 324-325.
13. Dodov Glavas-Dodov,5-Flurouracil in topical liposome gels for anticancer treatment–formulation and evaluation, Maja Simonoska, Act a pharm, 2003 (53), 241-250
14. Rupal Jani, Kaushal Jani,Setty C. Mallikarjuna, Preparation and evaluation of topical gel Valdecoxib. Dipti Patel, Inter. journal. Pharm. Sci. Research. 2010, 2(1), 51-54.
15. Goyal S, Sharma P, Ramchandani U, Shrivastava SK and Dubey PK: Novel anti-inflammatory topical gels. International Journal of Pharmaceutical and Biological Archives. 2011; 2(4): 1087-1094.
16. Shah VP: Transdermal drug delivery system regulatory issues. In: Guy R.H. and had graft J. (eds.), Transdermal drug delivery. Marcel Dekker, New York, 2003: 361-367.
17. Niyaz BB, Kalyani P, Divakar G: Formulation and evaluation of gel containing fluconazole antifungal agent. International Journal of Drug Development and Research. 2011; 3(4): 109-128.