



Review Article

Novel Drug Delivery System of Skin Fungal Infection

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ABSTRACT

Fungal infection of the skin are one of the regularly confronted with dermatological ailments in around the world. Topical treatment is an alluring decision for the treatment of the skin diseases because of its worthwhile, for example, focusing of medications to the site of contamination and decrease of the danger of systemic symptoms. As of now, antifungal medications are for the most part utilized as regular cream and gel arrangements in topical treatment. The productivity of that treatment relies on upon the penetration of medications through the objective layers of the skin at the viable focuses. In any case, stratum corneum, the outermost layer of the skin, is a viable obstruction for infiltration of medications into more profound layers of the skin. The physico-compound qualities of medication atoms and the sorts of the details are powerful considers topical medication delivery. In this review the novel drug delivery system for skin fungal infection.

1. INTRODUCTION

Fungal infection of skin

Fungal infection of skin is also known as mycosis. Mycosis is a common fungal infection affecting human skin and causes different dermatophyte infections. This is generally mild. Fungi may causes serious disease in patient with suppressed

and weakened immune system. The skin is the most extensive, readily accessible largest human body part and it having three functional layers i.e. epidermis, dermis, subcutaneous. The drug delivery skin route provides many advantages over traditional drug delivery systems. Topical Fungal Infections of the skin are one of often faced infectious diseases in world. The possibility of

fungal infections of skin, hair and nails can increase. [1]

Diverse sort of topical successful antifungal mixes has been utilized as a part of the treatment of an assortment of dermatological skin contaminations. The fundamental classes of topical antifungals are polyenes, azoles, and allylamine/benzy-lamines. Cicloprox is an antifungal specialist additionally utilized topi-cally. Right now, these antifungal medications are financially accessible in customary measurement structures, for example, creams, gels, moisturizers and showers.

The productivity of the topical antifungal treatment depends on the entrance of medications through the objective tissue. Subsequently, the successful medication fixation levels ought to be accomplished in the skin. In topical organization of antifungals, the medication substances ought to pass the *Stratum corneum*, which is the furthest layer of the skin, to achieve bring down layers of the skin, especially into practical epidermis. In this context, the plan may assume a noteworthy part for penetration of medications into skin. [2] Development of option methodologies for topical treatment of contagious contaminations of skin envelops new transporter frameworks for endorsed and investigational compound. Delivery of antifungal compound into skin can be upgraded with the carriers including colloidal system, vesicular transporters, and nanoparticles.

This review article focuses on the classification of topical antifungals used in treatment of various superficial fungal infections of skin. Recent studies which deal with the optimization of alternative formulation approaches for cutaneous administration of antifungals have also been summarized. [3]

1.2 Characteristics of fungi

1. Fungi are parasite i.e they are dead organic matter and live off living.
2. They identify or classify by their method of reproduction, which may be sexual or asexual.
3. Growing fungi have branched filaments called hyphae, which make the mycelium.
4. Yeasts form characterized by clusters of oval cells. In some conditions they form a chain of cells called a pseudo mycelium.

1.3 Types of fungal infections

Mycosis is most normal contamination and an assortment of natural and physiological condition helps in the improvement of parasitic diseases. Patients who are taking solid anti-infection agents for long time have high danger of contagious diseases. Since anti-microbials executes harming microscopic organisms, as well as slaughters sound microorganisms. The adjust of microorganisms in the digestive organs, mouth, vagina, and different places in the human body change, and results in an excess of parasite. Components that can bring about organism are high stickiness, invulnerable or hormone variations from the norm. [4]

1.3.1 Superficial parasitic contamination

Shallow mycosis is restricted to the furthest layers of skin and hair. Fungal diseases that predominantly influences the skin of senior individuals particularly the trunk, back, upper arms and legs. It doesn't influence the face. This organism delivers light spots which are lighter than the skin or the rosy dark colored. This organism exists in two structures, one is unmistakable spots introduce.

- Dermatophytes (tinea)
- Yeasts i.e. candida, malassezia, piedra
- Moulds

1.3.2 Cutaneous parasitic contamination

Cutaneous mycosis broadens further into the skin epidermis, and furthermore incorporates intrusive hair, skin and nail issues. These sicknesses are hindering the keratinized layers introduce on hair, and nails. The shallow mycosis, impact have resistant framework reactions might be evoked bringing about changes communicated in the different layers of the skin. [5]

- Mycetoma
- Chromoblastomycosis

1.3.3 Systemic parasitic diseases

This may because of taking in the spores of fungi, which normally introduce in soil or as astute infection in invulnerable bargained people.

Breathed in contagious disease: it is exceptional contamination and may influence the solid people.

The creature bringing on this disease are:

- Histoplasmosis
- Coccidioidomycosis

Artful contamination: this is just tainting who are now debilitated or having immunodeficiency issue.

Dangers of disease may include:

- Serious disease and debility
- Cancer or leukemia
- Diabetes mellitus
- Transplant
- Massive dosages of anti-toxins
- Parenteral nourishment
- Drug fixation

1.3.4 Skin parasitic infections

Organisms that cause skin sicknesses are called dermatophytes. "Dermatophytes" doesn't allude to a particular gathering of parasites, however they assault the dermis. Parasitic diseases of the skin

can be regarded with topical creams and also doctor prescribed medications. [6]

1.3.5 Competitor's Foot

Competitor's foot otherwise called *Tinea pedis*, it is the parasitic contamination of the foot. It causes tingling, consuming, redness, rankles and injuries. Competitor's foot is an exceptionally normal contamination. The growth develops in the warm, soggy condition, for example, shoes, socks, swimming pools, locker rooms, and floors of open showers. It is most basic in the mid year and in warm, muggy atmospheres. It happens all the more frequently in individuals who wear tight shoes and who utilize group showers and pools.

1.3.6 Muscle head tingle:

Tinea cruris, is a typical skin disease that is created by a kind of growth called tinea. The parasite flourishes in warm, soggy ranges of the body and accordingly, contamination can influence the private parts, internal thighs, and rear end. Contaminations happen all the more frequently in the late spring or in warm, wet atmospheres.

Side effects of muscle head tingle include:

- Itching, abrading, or consuming in the crotch or thigh
- A roundabout, red, raised rash with lifted edges
- Redness in the crotch or thigh
- Flaking, peeling, or breaking skin

1.3.6 Ringworm

Ringworm may likewise know as *Tinea corporis*, is not a worm, but rather a parasitic contamination of the skin. It can show up anyplace on the body and it would appear that a round, red, level sore. It is regularly joined by layered skin. The external piece of the sore can be brought while the skin up in the center seems typical. Ringworm can be

unattractive, yet it is normally not a genuine condition.

1.3.7 Yeast Infections

Yeast contaminations of skin is cutaneous candidiasis and are brought about by yeast-like growths called candida. They happen when yeast on the skin develops all the more effectively and causes a red, scaling, bothersome rash on the skin. Yeast diseases are not infectious. Yeast contaminations may influence almost any skin surface on the body, yet are well on the way to happen in warm, sodden, wrinkled ranges including the armpits and the crotch. candida contamination is particularly regular among individuals who are stout or who have diabetes. Individuals going for broke.

Reasons for fungal skin infection: The reasons for parasitic contamination include:

- Obesity
- If skin is not dried subsequent to showering
- Making contact with a man or creature that experience the ill effects of contagious disease
- Making contact with sullied things, for instance, towels, bedclothes and so forth.
- Walk shoeless in shower and pool zones
- Poorly controlled diabetes
- Weakened resistant framework, for instance, HIV/AIDS
- Recently taken a course of anti-microbials
- Major Antifungal Agents
- Fluoropyrimidines
- Polyenes
- Azoles

Table No.1 Novel Antifungal Drugs with Novel Delivery Systems

S. No.	Drugs	Class	Delivery system	Formulation	Site of application	Conclusion	References
1	Sulfamethoxazole	Antifungal	Dendrimer	Gel	Topically	Increased release rate when increasing the concentration penetration enhancer.	7
2	Dithranol	Anti-inflammatory	Dendrimers	Dye	Topically	enhanced permeation rate constant and lesser skin irritation.	8
3	Ketoconazole	Antifungal	Dendrimers	Hydrogel	Topically	Improvement of solubility with increase in higher release of drug.	9
4	Voriconazole	Antifungal	Micro emulsion	Oil	Topically	Better antifungal activity against the Candida albicans than its supersaturated solution.	10

5	Terbinafine	Antifungal	Nanostructure	Cream	Topically	Novel formulation having polymers which provide high efficacy and topical delivery.	11
6	Nystatin	Antifungal	Nanoparticles	Toothpaste	Topically	Sustained release of drug	12
7	Oxiconazole	Antifungal	Gel	Cream	Topically	It shows greater rate inhibition than marketed formulation.	13
8	Ampillicin	Antimicrobial	Liposomes	Cream	Topical	Increase stability and biological activity of drug obtained.	14
9	Sulconazole	Antimicrobial	Cream	Cream, Gel	Topical	It shows better effect than clotrimazole or miconazole	15
10	Itraconazole	Antifungal	Emulgel	Gel	Topical	Antifungal activity and drug release higher in formulation.	16
11	Bifonazole	Antifungal	Organogel	Gel	Topical	Increase spread ability of formulation	17
12	Clotrimazole	Antifungal	Ointment	Gel	Topical	Better spread ability, stability, viscosity and consistency of the formulation.	18
13	Hydroxypropyl- β -Cyclodextrin	Antifungal	Nail lacquer	Solution	Topical	An objective to target the drug in an effective concentration across nail plates.	19
14	Ciprofloxacin Hydrochloride	Antifungal	Nano particles	Cream	Topical	Prolonged drug release	20
15	Fluconazole	Antifungal	Ethosomes	Gel	Topical	Enhanced antifungal activity more than liposomes.	21
16	Terbinafine Hydrochloride	Antifungal	Gel	Gel	Topical	Better permeation of drug.	22
17	Voriconazole	Antifungal	Gel	Gel	Topical	Satisfactory for all parameters studies	23
18	Terbinafine	Antifungal	Niosomes	Nail lacquer	Topical	Minimum adverse effect and improved the adherence	24

19	Amorol	Antifungal	Nano particles	Nail lacquer	Topical	Improve drug delivery using ultrasound to increase permeability of nail.	25
20	Cyclodextrin	antifungal	Nano sponges	Solution	Topical	Release drug at the target site in controlled manner.	26

2. CONCLUSION

Topical treatment of the cutaneous diseases has been favored because of its superiorities over oral treatment, for example, evasion of systemic unfriendly impacts, focusing of the medication on the site of contamination, and high patient consistence. Then again, satisfactory medication fixations in target layers of the skin ought to be given to guarantee the adequacy of topical treatment. In this manner, conveyance of antifungals to target locale of the skin is an awesome test as far as restorative angle. In this unique circumstance, plan of topical item assumes a key part for infiltration of the medications

crosswise over skin. Moreover, the physicochemical properties of medication particles, for example, lipophilicity are likewise powerful parameter. By and large, antifungal medications are profoundly lipophilic compound, which can influence the infiltration of medications crosswise over stratum corneum. Different definition methodologies have risen over late years to advance new medication conveyance transporters of antifungal medications, and some promising information, to some degree, have been distributed.

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