



A Review on Formulation and Evaluation of Antifungal Topical Cream

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ABSTRACT:

The main aim of research was to develop an Antifungal cream formulation consisting of metronidazole for the treatment of fungal infection. Topical route is the most suitable route for skin infections. The development of topical drug delivery system designed to have systemic effects appear to be beneficial for a number of drug on account of several advantage over conventional dosage forms route of drug administration.

The valuable tools for use in the development of topical metronidazole product intended for local action and indicate the potential for general use with other topical products. The formulation was subjected to in vitro diffusion studies. Microbiological studies were performed to find out the safety of materials used in formulation. The developed cream consisting of Metronidazole was found to be safe and effective for the treatment of fungal infection.

Introduction:

The development of topical drug delivery system designed to have systemic effect appear to be beneficial for a large number of drug on account of several advantage over conventional route of drug administration in order to optimize both the release of drug from the topical vehicle and skin permeation. The topical antifungal agent have varying mechanism of action and different spectrum of activity and have few adverse reaction or drug interaction. Several antifungal agent are available on the market in different topical preparation (e.g. cream, ointment, and powder for the purpose of local dermatological therapy) One of these antifungal agent is metronidazole, which has both anti-fungal and antibacterial properties. It is applied locally in mild uncomplicated dermatophyte and other cutaneous infection. Fungal infection also called mycoses represent the invasion of tissue by one or more species of fungi which may cause superficial, localized, deeper tissue infection to serious lung, blood or systemic disease. Some fungi are pathogenic, causing disease whether the immune system is healthy or not. Topical treatment of fungal infection has several superiorities including, targeting the site of infection, reduction of risk of systemic side effect, enhancement of the efficacy of treatment and, high patient compliance. Different type of topical effective antifungal compounds has been used in the treatment of a variety of dermatological skin infection. Currently, these antifungal drug are commercially available in conventional dosage forms such as cream, gels, lotions, sprays. The most common therapeutic options are systemic and topical antifungal agent; however, oral antifungal are associated with adverse effect that can cause patient to discontinue treatment, which may be complicated by the presence of comorbid conditions. Antifungal drug should reach effective therapeutic levels in via epidermis after dermal administration. The greatest challenge for dermal delivery is stratum corneum, in order to improve its permeability, new formulation approaches have been investigated. Common example for topical skin infections include diaper rash, cold sores, and tinea versicolor. Diaper rash is a form of irritant contact dermatitis. There are two groups of drug product that are topically administered through the skin. The category include product that are applied for local action. In this case, the active ingredient stay on skin surface or penetrate through the epidermal layer and may reach dermis, but are not absorbed into blood circulation. This group is usually defined as topical drug delivery system.

The active ingredient are delivered into the general blood circulation to produce a therapeutic response by traversing through the different layer of skin. Cellulitis is a chronic condition that is been handled early in any medical setting, from primary to tertiary cares. All age is been affected, suddenly in healthy patient also, there is several local and general condition that might favor the occurrence.

Over the last decades the treatment of illness have been accomplished by administrating drug to human body via various routes namely oral, sublingual, rectal, parental, topical, inhalation etc. Topical delivery can be defined as the application of a drug containing formulation to the skin to directly treat cutaneous disorder or the cutaneous manifestations of general disease with the intent of containing the pharmacological or the effect of drug to the surface of the skin or within the skin. Semisolid formulation in all their diversity dominate the system for topical delivery. But foam, spray, medicated powder, solution and even medicated adhesive system are in use.

ADVANTAGE OF TOPICAL DRUG DELIVERY SYSTEM

1. Avoidance of first pass metabolism.

2. Convenient and easy to apply .
3. Avoid of risk .
4. Inconveniences of intravenous therapy and of the varied conditions of absorption like ph change presence of enzyme gastric emptying time etc.
5. Achivement of efficacy with lower total daily dosage of drug by continuous drug input .
6. Avoid fluctuation of drug levels inter and intra patent variations .
7. Skin irritation or dermatitis may occur due to the drug .
8. Vary slow absoerption .
9. It can be used only for those drugs which need vary small plasma concentration for action .
10. Can be used only for drug which require vary small plasma concentration for action .
11. Possibility of allergic reaction .
12. Drug of larger partical size not easy to absorb through the skin .

PHYSIOLOGY OF HUMAN SKIN :

Epidermis :

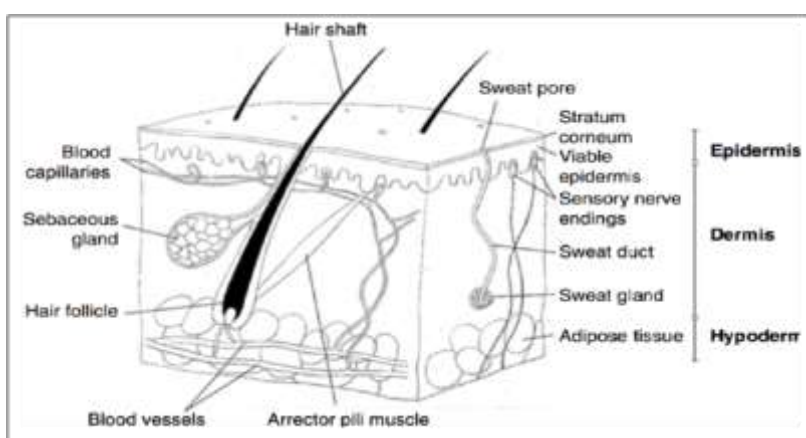
The epidermis is the most superficial layer of the skin and is composed of stratified keratinized squamous epithelium , which varies in thickness in different parts of the body . It is thickest on the palms of the hand and soles of the feet . There are no blood vessel or nerve ending in the epidermis , but its deeper layer are bathed in interstitial fluid from the dermis , which provide oxygen and nutrient , and drains away as lymph .

ERMIS :

The dermis is tough and elastic . it is formed from connective tissue and the matrix contain collagen fibre interlaced with elastic fibres . rupture of elastic fibres occur when the skin is overstretched , resulting in permanent striae , or stretch marks ,that may be found in pregnancy and obecity . collagen fibre bind water and give the skin its tensile strength , but as this ability declines with age , wrinkles develop . fibroblasts , macrophages and mast cell are the main cell found in the dermis . Underlying its deeper layer there is areolar tissue and varying amounts of adipose tissue .

SUBCUTANEOUS GLAND :

These consist of secretory epithelial cells derived from the same tissue as the hair follicles . They secrete an oily substance , sebum ,into the hair follicles and are presence in the skin of all parts of the body except the palms of the hands and the sole of the feet . They are most numerous in the skin of the scalp , face , axillae , and groins .In region of transition from one type of superficial epithelium to another ,such as lips, eyelids , nipple ,labia minora and gians penis , there are sebaceous gland that are independent of hair follicles ,secreting sebum directly onto the surface.



FUNCTIONS OF SKIN:

Skin performing following functions:

- a) **Protection:** An anatomical barrier from pathogen and damage between the internal and external environment in bodily defence , Langerhans cell in the skin are part of the adaptive immune system .

- b) **Sensation:** contain a variety of nerve ending that react to heat and cold, touch, pressure, vibration, and tissue injury, see soma to sensory and haptics.
- c) **Heat regulation:** The skin contain a blood supply for greater than its requirement which allows precise control of energy loss by radiation, convection and conduction.
Dilated blood vessel increase perfusion and heat loss, while constricted vessels increase greatly reduce cutaneous blood flow and conserve heat.
- d) **Control of evaporation:** The skin provides a relatively dry and semi impermeable barrier to fluid loss . loss of this function contributed to the massive fluid loss in burns.
- e) **Aesthetics and communication:** Others see ours skin and can assess our mood, physical state and attractiveness.
- f) **Storage and synthesis:** Acts as a storage centre for lipid and water , as well as means of synthesis of vitamin D by action of UV part of skin
- g) **Water resistance:** The skin acts as a water resistant barrier so essential nutrient washed out of the body.

DISEASES OF SKIN

a) Vitiligo

Vitiligo is a condition in which areas of skin lose their normal pigment and so become white. It is common, and affects about 1% of the world's population. The pigment that gives your skin its normal colour is melanin, which is made by cells known as melanocytes.

b) Scabies

Scabies is a common and very itchy skin condition caused by human scabies mites. It can affect people of any age but is most common in the young and the elderly. The mites that cause scabies are tiny parasites, smaller than a pinhead. The rash of scabies is a mixture of scratch marks and red scaly areas; later it can become infected and develop small pus spots.

c) Rosacea

Rosacea is a common rash, found on the central part of the face, usually of a middle aged person. A tendency to flush easily is followed by persistent redness on the cheeks, chin, forehead and nose. The cause of rosacea is not fully understood, but many think that the defect lies in the blood vessels in the skin of the face, which dilate too easily.

d) Psoriasis

Psoriasis is a common skin problem affecting about 2% of the population. It occurs equally in men and women, at any age, and tends to come and go unpredictably. It is not infectious, and does not scar the skin. The skin is a complex organ made up of several different layers.

e) Melanoma

Cutaneous malignant melanoma is a cancer of the pigment cells of the skin. If it is treated early, the outlook is usually good. It is not contagious. The word „melanoma“ comes from the Greek word „melas“, meaning black. Melanin is the dark pigment that gives the skin its natural colour.

f) Eczema (Atopic Eczema)

Atopic eczema is an inflammatory condition of the skin. Atopic is the term used to describe conditions such as eczema, asthma, seasonal rhinitis and hay fever, which often have a genetic basis. Eczema is the term used to describe changes in the upper layer of the skin that include redness, blistering, oozing, crusting, scaling, thickening and sometimes pigmentation.

CREAM :

Cream are the topical preparation which can be applied on the skin . cream are defined as “ viscous liquid or semi – solid emulsion of either the oil – water or water –oil type “ dosage form which consistency varies by oil and water . Cream are used cosmetic purpose such as cleansing , beautifying ,improving appearance ,protective or for therapeutic function .these topical formulation are used for the localized effect for the delivery of the drug into the underlying layer the skin or mucus membrane . These product are designed to be used topically for the better site specific delivery of the drug into skin for skin disorder .

Cream are considered as a pharmaceutical product as they are prepared based on technique develop in the pharmaceutical industry ; unmedicated and medicated cream are highly used for the treatment of various skin condition or dermatoses . Cream can be ayurvedic , herbal , allopathic which are used by people according to their need for their skin condition . They contain one or more drug substance dissolved or dispersed in a suitable base . Cream may classified as o/w or w/o type of emulsion on the basis of phases. The term „Cream „, has been traditionally applied to semisolid formulated as either water –in –oil (e.g; coid cream) or oil – in- water (e .g. ; vanishing cream) .

CONCLUSION:

The formulation of the antifungal agent Metronidazole exhibited an anti-bacterial and anti-fungal. The results of different chemical and physical tests of cream showed that it could use topically in order to protect against skin infections caused by fungus.

Topical drug delivery system provides effective and safe MTZ for local bacterial infection and fungal treatment

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