Journal of Drug Delivery Science and Technology 30 (2015) 63–73

Contents lists available at ScienceDirect

Journal of Drug Delivery Science and Technology

journal homepage: www.elsevier.com/locate/jddst

Review article

Nail psoriasis: An updated review of clinical reports on therapy and formulation aspects for topical delivery

Monica Joshi, Vijay Sharma, Kamla Pathak*

Department of Pharmaceutics, Rajiv Academy for Pharmacy, Mathura, 281001, Uttar Pradesh, India

ARTICLE INFO

Article history:
Received 29 May 2015
Received in revised form
17 September 2015
Accepted 24 September 2015
Available online 30 September 2015

Keywords:
Nail psoriasis
Therapies
Nail lacquer
Permeation enhancement

ABSTRACT

The treatment of the psoriatic nails is strenuous and systemic therapies are associated with various side effects that lead to patient incompliance. Topical therapy seems to be mainstay approach that limits side effects and is patient compliant. The topical formulations include creams, gels, and ointments and nail lacquers. Of these nail lacquers appear to be promising, patient friendly formulation. However, the major challenge through topical route is inefficient permeation of drug through dense keratinized nail plate to reach target sites: nail matrix and nail bed. Chemical and physical enhancement techniques can be used for enhancing the drug permeation through nail plate. There has been quite a lot of research in this field in recent times. The current review focuses on various clinical reports on systemic, topical and peripheral therapies (intralesional, phototherapy and laser). It primarily focuses on topical nail lacquer formulation wherein an attempt has been made to summarize the factors affecting permeation of drug across the nail plate. Further, physical and chemical modes for permeation enhancement have been described. Finally the medicated nail lacquers as an effective and novel drug delivery system for treating nail psoriasis has been reviewed.

Contents

* Corresponding author.
E-mail address: kamlapathak5@gmail.com (K. Pathak).

http://dx.doi.org/10.1016/j.jddst.2015.09.017
1773-2247/

1. Introduction

Psoriasis is an autoimmune disease that has significant impact on the patient's social life that results in morbidity. The patient gradually progresses towards a state of depression and frustration that develop as a result of ineffectiveness of therapies in effective management of psoriasis. The pathogenesis of the psoriasis involves tumor necrosis factor-α (TNF- α), dendritic cells and T-cells [1] and is explained diagrammatically in Fig. 1. Exogenous and endogenous antigens that provoke immune responses activate dendritic cells that are considered to be the key initiator of this disease. Their interaction with the T cells located in upper epidermis in perivascular location results in generation of inflammatory response. $CD8^+$ cytotoxic T cells and Type 1 $CD4^+$ T Helper cells release large quantities of type 1 cytokines, interleukin-2, TNF-α that results in keratinocyte hyperproliferation, anginogenesis and inflammatory responses observed in psoriasis in the form of scaly lesions [2,3].

Around 80–90% of the patients suffering from skin psoriasis develop nail psoriasis and that may lead to longer duration and greater extent of skin psoriasis [4]. Earlier research report has asserted that involvement of nails in psoriasis may lead to severe psoriasis [5]. A strong relation also exists in between nail psoriasis and psoriatic arthritis. Involvement of the nail and long lasting nail bed psoriasis was higher in patient with psoriatic arthritis [6]. Moreover providence to get infected with dermatophytes increases in patients of nail psoriasis [7]. Nail psoriasis may result in high degree of pain and is associated with aesthetic concerns. Psoriasis involves two patterns of nail disorders. Manifestations that result from the involvement of nail matrix are pitting, red spot in lanula, leuchonychia and nail plate crumbling while when nail bed is involved, the manifestations are oil drop discoloration, onycholysis, splinter hemorrhages and subungual hyperkeratosis [8].

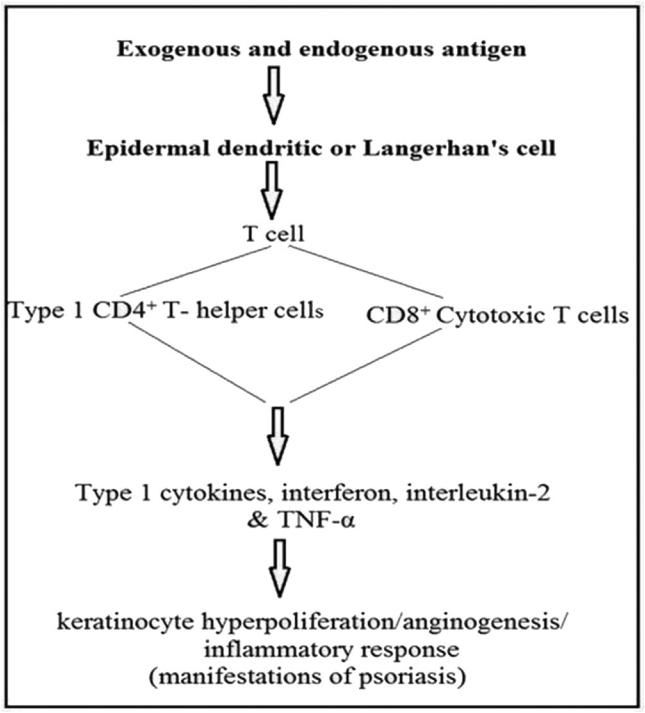

Fig. 1. Schematic representation of the mechanism of psoriasis.

Nail psoriasis severity index (NAPSI) is a recently developed scoring system used to determine the severity of nail bed psoriasis and nail matrix psoriasis by the area that is involved in nail unit and it can be used for evaluating the response to treatment given in nail psoriasis during clinical trials. As per NAPSI, a nail is divided into four quadrants. If any of the manifestations as mentioned above for nail matrix psoriasis and nail bed psoriasis, are not present the score is 0, if present in 1 quadrant the score is 1, the score is 2 if two quadrants of the nail are affected, 3 if present in three quadrants of the nail and 4 if present if entire nail is involved. 0–4 score is given for each nail matrix and nail bed. Total nail score is 0–8, which is the sum of two individual scores. The scale is from 0 to 32 for the nail [9].

Systemic treatments are known to be effective against nail psoriasis but are associated with the various systemic side effects like hypertension and renal toxicity associated with cyclosporine, severe hypervitaminosis A syndrome with retinoids, leucopenia and hepatotoxicity with methotrexate [10] to name a few, hence is not a proficient approach for the management of nail psoriasis. Topical therapy as a result of its localized effects, minimum systemic adverse effects and higher degree of patient compliance is recommended. However, poor permeability of drug through the nail plate makes topical therapy ineffective [11]. Over the past few years various research reports on enhancing the drug delivery through the nail, based on chemical and physical methods of permeation enhancement have been published that seems to be essential to achieve successful treatment approach in nail psoriasis. In the present review various treatment approaches for nail psoriasis covering systemic, topical, intralesional, lesional and phototherapy are covered. Amongst these, topical therapy via nail lacquers, in particular, has been reviewed as the formulation offers targeting the drug to nail bed and nail matrix, substantial adherence of the formulation at the site and patient compliance.

2. Treatment approaches for nail psoriasis management

For the dermatologist as well as for the patient the treatment of nail psoriasis is a challenging task. Due to the slow growth of the nail plate, response towards the therapy becomes protracted [12] and therefore patient looses faith towards the therapy. Various research reports can be found in literature but an effective treatment approach for nail psoriasis is still elusive. The following text describes the approaches for therapy of nail psoriasis.

2.1. Systemic therapy

Methotrexate, cyclosporine and acitertin are used as a conventional treatment options for psoriasis as well as nail psoriasis treatment. Acitretin as a result of its gradual onset of effects is used in long term treatment of psoriasis as maintenance therapy while methotrexate and cyclosporine provide rapid onset of action. However, due to cumulative toxicities their long term use is not