Evaluation of Subclinical Nail changes in Patients with Chronic Plaque Psoriasis using Dermoscopy

Thesis

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By

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INTRODUCTION

Psoriasis is a chronic, inflammatory, skin disorder that causes a considerable degree of morbidity and mortality. The severity of psoriasis may vary from mild localized distribution to more severe erythrodermic forms ***(Jiaravuthisan and Sasseville, 2007).***

Psoriasis is a disorder with a relatively high prevalence in the general population. The estimated worldwide prevalence ranges from 0.6% to 4.8% of the population ***(Ruceviae et al., 2003; Naldi, 2004)***. With an incidence of 2.5% in Caucasians and 1.3% in African-americans ***(Brzewski et al., 2013).***

Although, skin involvement is the most commonly encountered form of psoriasis, nail involvement represents a recognizable feature of chronic psoriasis. Nail psoriasis can occur in up to 50% of psoriasis patients, Only 5–10% of nail psoriasis cases are thought to occur in the absence of cutaneous disease ***(Pasch, 2016).***

The prevalence of nail psoriasis in men is about 11% higher than in women ***(Augustin et al., 2010).***

Nail psoriasis leads to impairment in the quality of life due to aesthetic concerns as well as limitations in daily activities resulting from the associated pain ***(De Berker, 2009).***

Histopathological features of nail psoriasis show similarities with skin psoriasis as mouds of parakeratosis and neutrophilic microabcesses in the nail plate as well as vasodilatation and neutrophilic infiltrate in the nail bed ***(Grover et al., 2012).***

The clinical manifestations associated with nail psoriasis are different in their representations and correlate with the anatomical location of the nail unit that is affected by the disease. If the nail disease stems from the nail matrix, possible representations are leuconychia, red spots, pitting and crumbling. If the nail disease is derived from the nail bed, possible manifestations are oil-drop discolouration, splinter haemorrhages, subungual hyperkeratosis and onycholysis ***(Jiaravuthisan and Sasseville, 2007).***

The most common clinical manifestation is pitting, although others are more severe and can greatly impact the function of the patient ***(Jiaravuthisan and Sasseville, 2007).***

Dermoscopy is a new noninvasive diagnostic technique for observation of nail and skin lesions ***(Lacarrubba et al., 2010).***

Nail dermoscopy is becoming more and more frequently utilized for the diagnosis of nail disorders, it can be formed with handly dermoscope or with a video dermoscope, which allows magnification up to 200x, all nail disorders can be observed by dermoscopy ***(Piraccini et al., 2012).***

According to the recent study by **Yadav and colleagues**, dermoscope demonstrated a clinical usefulness in the detection of early nail involvement in psoriasis and aid in differentiating it from other disorders of nails ***(Yadav and Khopkar, 2015).***

Aim of the Work

The aim of this work is to report frequency and types of subclinical nail changes among patients with chronic plaque psoriasis in comparison with nail changes in normal healthy controls using dermoscopy and to evaluate the clinical usefulness of dermoscopy for the detection of subclinical onychopathies in patients with chronic plaque psoriasis.

Chapter 1
NAIL APPARATUS

Nails are ectodermal appendages covering the dorsal aspects of the digits. These structures provide protection and integrity to the fingertip, in addition to facilitating skilled hand functions. ***(Pandhi and Verma, 2012).***

A) Purpose and function:

The main purpose of the nail apparatus is to provide a protective covering, known as the nail plate, over the dorsal aspect of each distal digit of the hands and feet. In addition to shielding the fingertips from traumatic injury, the nail plate also applies a pressure that opposes the volar side of the terminal phalanx, which contributes to the enhanced sensory discriminatory ability of the fingertips. ***(De-Berker et al., 2007).***

B) Embryology of the nail apparatus:

The earliest signs of growth and differentiation related to nail development are seen at 8 weeks' gestation. The first anatomically recognizable feature, however, is visible at 9 weeks' gestation. At this early age, an invagination of the primitive epidermis forms an uninterrupted groove that delineates a flattened surface at the end of each digit known as the nail field (Fig 1).

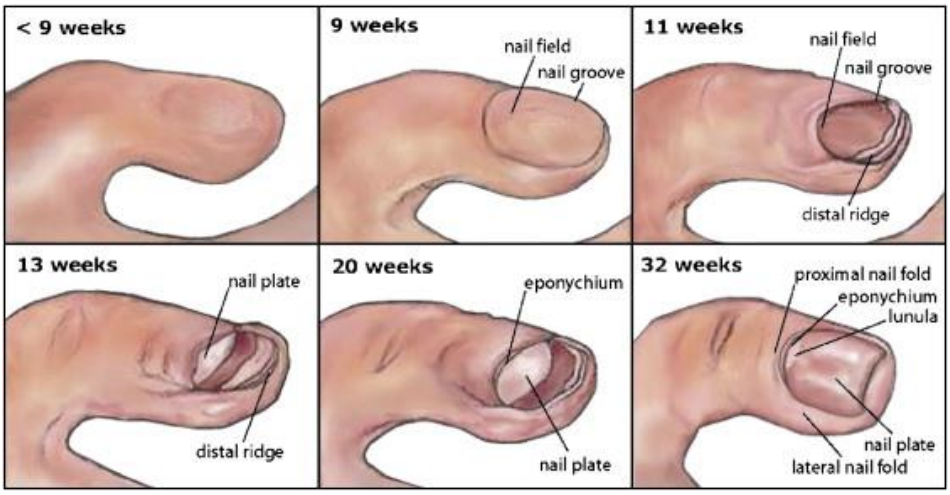

Figure (1): Fetal development of the nail apparatus.

Table (1): Summary of nail development.

No. of weeks' gestation	Development
9	Nail field and grooves
11	Matrix primordium and distal ridge
13	Initiation of nail plate
20	Normal adult keratinization in matrix
32	Distinct nail unit structures

C) *Anatomy of the nail apparatus:*

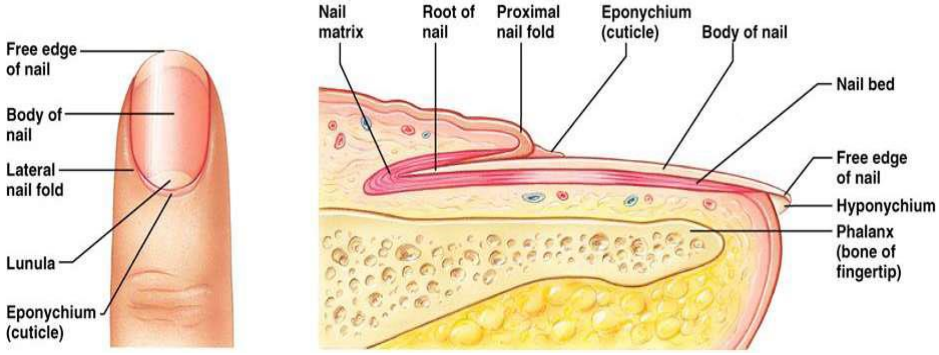

Figure (2): Finger nail structure ***(Yin et al., 2013).***

The anatomic structures of the nail include (from distal to proximal): Hyponychium, onychodermal band (ODB), nail bed, nail plate, lateral nail folds (LNF) (perionychium), lunula (distal part of the matrix), cuticle, nail matrix, proximal nail fold (PNF) (eponychium) (Figure 2) ***(Rich, 2005; Ximena and Gregor, 2006).***

Structures of the nail unit:

1. ***Hyponychium:***

It is the portion of the nail unit that is distal to the nail bed and under the free edge of the nail plate. It is continuous with the volar skin of the digit. The hyponychium extends proximally to the distal groove and ODB ***(Rich, 2005).***

It represents the junction of the terminal nail bed with skin of the fingertip. The nail plate becomes non-adherent at this point and extends from a variable distance over the tip of the finger ***(Ximena and Gregor, 2006).***

2. Onychodermal band:

The onychodermal band is an ill-defined transverse band of a deeper pink that marks the transition of the nail bed to the hyponychium. Its integrity is important for the health of the nail bed ***(Haneke, 2006).*** It represents the first barrier to penetration of materials to beneath the nail plate (Figure 3) ***(De-Breker et al., 2007).***

3. Nail bed:

The nail bed is the distal continuation of the matrix. It does not produce nail plate substance hence the term (sterile matrix).it is the vascular bed upon which the nail rests extending from the lunula to the hyponychium ***(Tosti et al., 1996).***

There is no subcutaneous tissue in the nail bed, so immediately beneath the nail bed lies the periostium of the distal phalanx ***(Rich, 2005).*** The function of the nail bed is to allow the nail plate to grow longitudinally keeping it strongly attached to it ***(Tosti et al., 1996).***

The nail bed epithelium-connective tissue interface is characterized by unique longitudinal rete ridges, in which 3 to 6 layers of longitudinally running capillaries are arranged one above the other. Trauma to these capillaries may produce splinter haemorrhages which are equivalent to Auspitz' sign in the skin. The connective tissue of the nail bed is a firm layer

directly attached to the bone without any subdermal fat; this and the abundance of nervous structures in the nail bed and matrix are probably the reason for the severe pain elicited by trauma to the nail ***(Kim et al., 2011).***

4. Nail plate:

The nail plate is a rectangular, translucent, and relatively inflexible structure that overlies the distal digits of the hands and feet. It arises from beneath the PNF and is bordered on both sides by the lateral nail folds. It is composed of multilayered, stacked sheet of compacted keratinized epithelial cells approximately 25 layers that are intimately fused and translucent. These cells derived from anucleate onychocytes that arise from the germinal matrix epithelium where the proximal matrix gives rise to the superficial (dorsal) part of the nail plate and the distal matrix makes the under-surface (ventral) part of the nail plate ***(De-Berker et al., 2007).***

The nail plate appears pink because it transmits the coloration of the blood vessels of the nail bed beneath ***(Daniel, 2004).***

The nail proliferation activity is higher in its proximal portion than distally so that more nail substance is formed proximally and the nail plate achieves a natural convex curvature from proximal to distal ***(Rich, 2005).***

5. Nail folds:

Nail folds occur proximally (posterior) and laterally (2 lateral and 1 proximal), demarcating the prospective nail field and encloses more than 75% of its periphery, providing a physical seal against the penetration of materials to vulnerable subungual and proximal regions (figure 3) ***(Daniel, 2004; De-Berker et al., 2007).***

6. Lunula (half-moon):

It is the convex margin of the matrix seen through the nail. It is paler than adjacent nail bed. It is most commonly visible on the thumb and great toe and may be concealed by the proximal nail fold. It provides protection to the matrix and makes it less vulnerable to irritants and trauma ***(De-Breker et al., 2007).***

7. Cuticle:

The cuticle is a thin layer of keratin produced by the undersurface of the proximal nail fold (PNF). Approximately halfway, it divides into the true eponychium which remains firmly attached to the dorsal surface of the nail plate, and the false eponychium attached to the epidermis of the PNF's ventral surface. The function of the cuticle is to seal the cul-de-sac or nail pocket ***(Perrin, 2008).***

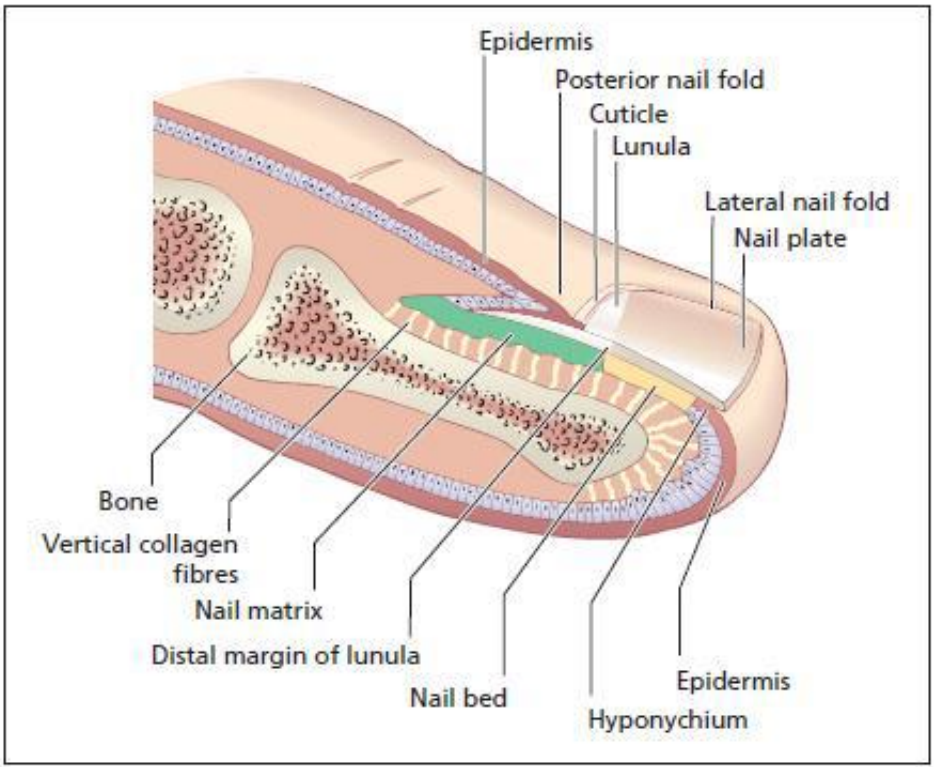

Figure (3): Longitudinal section showing dorsal nail apparatus ***(Cohen, 1996).***

8. Nail matrix: (Nail root):

The nail matrix is the only structure to produce the nail plate. Most of the matrix is covered by the proximal nail fold. The matrix epithelium consists of a basal compartment seen as cuboid basophilic cells that migrate up to form the more eosinophilic superficial compartment ***(Perrin et al., 2004).***

The matrix connective tissue is relatively loose containing blood vessels and a considerable number of glomus bodies.

The matrix dermis has an important morphogenetic capacity allowing it to reproduce matrix epithelium when

enough of it is left after trauma or superficial surgical removal ***(Kim et al., 2011).***

The matrix has been divided into distal sterile matrix (nail bed), which is covered with grown nail, intermediate matrix that corresponds to the epithelial lining of the ventral surface of the proximal nail fold, and the distal germinal matrix, from which a new nail arises (figure 4) ***(Grover et al., 2012).***

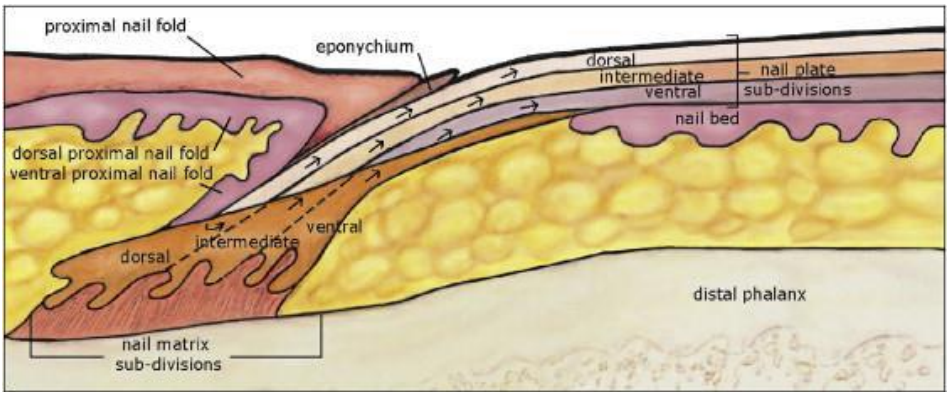

Figure (4): The proximal matrix forms the superficial part of the nail plate and the distal matrix makes the under-surface part of the nail plate ***(Jiaravuthisan et al., 2007).***

9. Nail isthmus:

The nail isthmus is a transitional zone between the most distal part of the nail bed and the hyponychium. The nail isthmus shows two regions; a proximal narrow part and a distal wide part. The proximal narrow region has supposed function as an anchor for the inferior border of the nail plate. The distal wide region produces semihard keratins possibly against repeated trauma toward the separated area between the nail plate and the hyponychium ***(Perrin, 2008).***