"CROSS SECTIONAL STUDY TO CORRELATE CLINICAL SEVERITY OF NAIL CHANGES USING NAPSI SCORING AND DERMOSCOPIC NAIL CHANGES IN PATIENTS OF PSORIASIS."

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LIST OF ABBREVIATIONS USED

Sl. No.	Abbreviation	Expansion
1	HLA	Human leukocyte antigen
2	APC	Antigen presenting cells
3	IFN – GAMMA	Interferon – gamma
4	TNF- ALPHA	Tumor necrosis factor – alpha
5	CD – 4	Cluster of differentiation -4
6	DIP	Distal interphalangeal joint
7	PsA	Psoriatic arthritis
8	BSA	Body surface area
9	PGA	Physician global assessment score
10	PASI	Psoriasis area severity index
11	NAPSI	Nail psoriasis severity index

ABSTRACT

Introduction: Nail psoriasis is a common, often misdiagnosed disease affecting patients both functionally and psychologically. Nail involvement occurs in approximately in 40% - 50 % of patients suffering from cutaneous psoriasis and in 5 % of the patient as a sole presentation. Nail changes associated with psoriasis are mostly asymptomatic in the initial stages of the disease and may be the first presentation, hence examination and evaluation of the nail changes routinelyis of foremost importance. An objective scoring system called nail psoriasis severity index (NAPSI) has been devised which is a simple, reproducible tool to observe the nail changes in psoriasis as well as to assess the efficacy of various therapeutic modalities. Nail matrix involvement leads to pitting, red spots in the lunula, crumbling and leukonychia while nail bed involvement presents with onycholysis, oil spots, subungual hyperkeratosis and splinter haemorrhages.

A dermoscope is a non-invasive, diagnostic tool which is used to examine the minute presenting patterns of skin lesions and also the subsurface skin structures which are invisible to the eye. The term “onychoscopy” was coined for dermoscopic examination of nail unit. It holds a distinct place in the diagnostic work up of nail disorders by enhancing the visible nail features and subtle non visible features.

Objective: To find a correlation between the onychoscopic nail changes with clinical severity of nail changes through NAPSI scoring in psoriasis patients with nail changes. Our secondary objective was to find a correlation between clinical severity using PASI score and severity of nail changes using NAPSI score.

Materials and method: This was a one-year hospital based cross sectional study on 60 patients who were clinically diagnosed as psoriasis and had related nail changes, irrespective of age or sex. The cutaneous involvement was calculated using the PASI scoring system. The nail changes of all the finger and toe nails were scored using NAPSI scoring system with appropriate clinical photographs. Dermoscopic/onychoscopyexamination of the nails was performed using a video-dermatoscope (Dinolite premier AM4113ZT model), with relevant photographs. The nail changes observed on dermatoscopic examination was scored using the NAPSI scoring system. Additional nail changes on clinical and dermatoscopic examination were noted.

Results- Psoriasis was more common in males with sex ratio of 2.15:1. The mean age of onset of the disease was 48.92 years. The mean duration of psoriasis was 9. 45 years. Chronic plaque type of psoriasis was the most common type of psoriasis. 51.67% of the patients had joint complaint. The mean PASI score, mean clinical NAPSI score and mean onychoscopy NAPSI score was 9.27, 34.42, and 44.0 respectively in our study. Males had a higher mean NAPSI on both clinical and onychoscopy examination implying that males had more nail changes compared to females. Finger nails were more frequently affected than toe nails in our study, on both clinical and onychoscopy examination. Onychoscopically evaluated NAPSI score was statistically significantly higher compared to the clinically evaluated NAPSI score proving that onychoscopy examination to be a better method for evaluation of nail changes. There was a positive correlation between the PASI score and the NAPSI scores by both methods proving that more the cutaneous involvement, higher was the extent of nail involvement .Pitting was the most common nail change found on clinical and onychoscopy examination followed by subungual

hyperkeratosis on clinical examination and onycholysis on onychoscopy examination as the second common nail feature. Leuconychia, red spots in lunula, onycholysis and splinter hemorrhages were better visualized on onychoscopy examination. Most common additional feature observed both on clinical and onychoscopy examination was longitudinal striations, followed by beau's line, although these additional features were better visualized on onychoscopy examination.

Conclusion - From this study, we conclude that nail examination using a dermoscope aids in the diagnosis of the subtle changes in the nails of psoriasis patients. We observed that red spots in lunula, leukonychia, onycholysis and splinter haemorrhages could be better visualised using a dermoscope. We also observed that onychoscopy was useful in early diagnosis of minimal onycholysis, evaluation of clinically indistinguishable onycholysis cases due to the presence of linear erythematous border, visualisation of pits which could not be clinically observed due to the exogenous pigmentation were better detected by onychoscopy method. Dermoscopic evaluation of nails is a preferred, non-invasive, easy bedside method, which can help to diagnose nail psoriasis even in patients with isolated nail involvement. This can also help obviate the need of painful procedures like nail biopsy in patients with clinical suspicion of psoriasis.

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INTRODUCTION

Psoriasis is a hyper proliferating cutaneous disease with a worldwide prevalence of 1% to 2%. It is a long standing, stigmatizing, inflammatory papulosquamous disease. It runs an on and off course ranging in severity and causes great agony (physical and psychosocial) thereby affecting the patient's quality of life.[1, 2]

Psoriasis commonly presents with cutaneous involvement, with joint affected in up to one-third of patients and nails in approximately half of the patients. [3]

Nail changes are estimated in 40% of patients suffering from cutaneous psoriasis and in 5 % patients may be a sole presentation. Nail alteration in psoriasis are mostly asymptomatic in the early stages or can be first presentation, hence examination and evaluation nail changes routinely is of foremost importance. Various modes of evaluation include clinical, ultrasonographical or by dermoscope.[1, 3]

Dermoscope is a non-invasive, diagnostic tool used for finding subtle skin patterns, lesions and vascular structures not seen on clinical examination. The other terminologies are epiluminescence microscope, skin surface microscope, episcope.[4]

Onychoscopy refers to use of dermoscopy for examining nail unit. It holds a distinct place in helping to diagnose nail disorders by enhancing the easily seen nail features and revealing the subtle non-visible features .[5]

The Nail Psoriasis Severity Index (NAPSI) is an easy objective method for assessment of nail psoriasis. It evaluates the nail bed and nail matrix involvement in

terms of area and severity of involvement. Clinical trials use this score for assessment of response to treatment .The scale is easy to use and easily reproducible.[6]

Very few studies are present to correlate the nail changes in psoriasis on clinical and onychoscopy examination. This study was done to establish a correlation of the nail changes in psoriasis patient using clinical and onychoscopy method of examination and to correlate disease severity with nail severity involvement.

AIMS AND OBJECTIVES

- **Primary objective:**

To find correlation between the onychoscopic nail changes with clinical severity of nail changes through NAPSI scoring.

- **Secondary objective**:

To find the correlation between clinical severity using PASI score and severity of nail changes using NAPSI score.

REVIEW OF LITERATURE

INTRODUCTION -

Galen [133 – 200 AD] is credited to coin the term "psoriasis", derived from a Greek word - 'psora' meaning to itch. [7] Psoriasis is a long standing inflammatory cutaneous condition affecting the patient's quality of living. It is characterized by active division of keratinocytes which is medicated by T-cells .[1,8] It affects people of all races around the world with no sex predilection , affecting all age group and social strata.[9] The characteristic lesions are red, scaly, sharply demarcated , thick plaques over the extensor surfaces of the limbs and the scalp.[10] It is characterized by periods of remissions and exacerbations. [9]

Psoriasis vulgaris or plaque psoriasis is the most common type affecting 90% of the population. . Other variants include guttate psoriasis, flexural psoriasis, palmoplantar psoriasis, follicular psoriasis, pustular psoriasis, inverse psoriasis, erythrodermic psoriasis, nail psoriasis and arthropathic psoriasis. [11, 12]

The effects of nail psoriasis are both physical as well as psychological, thereby leading to a remarkable decreased standard of living. Approximately , 10-78% psoriatic patients suffer from concurrent nail changes , while 5 – 10 % patients have isolated nail involvement.[13]

HISTORICAL BACKGROUND-

- Psoriasis has existed for centuries. The earliest descriptions of psoriasis are given in the corpus hippocraticum. [14]

- Hippocratus [400 – 377 BC] grouped scaly lesions under the term lopoi [from ' lepo' meaning to scale], but it was Celsus [25BC – 45AD] who described psoriasis nearly 2000 years back in his book 'Dee Medical' under the heading of impetigo [Latin word 'impeto' meaning to attack].[13]
- Galen [133 – 200 AD] coined the term psoriasis , taken from a Greek word 'psora' meaning itch, although he was likely describing seborrhoeic eczema .[7]
- Henrich Auspitz [1835 – 1886] introduced the terms acanthosis and parakeratosis in pathology and also called attention to bleeding points on removing the scales of psoriasis. This sign was later named as Auspitz sign in his honour. [14]

EPIDEMIOLOGY-

- Psoriasis has a universal occurrence and the incidence varies considerably .[12]
- According to records, its prevalence varies from 0.1% to 11.8%. [9,10]
- In the United States of America, psoriasis is seen in approximately 2%. The prevalence is 0.3% or less in Mongoloid population while 2% or more in the Scandinavian population.[7,11]
- In India, the reported incidence of psoriasis has varied from 0.84% to 5.6% in different studies.[15-20]
- A retrospective study in North India by Okhandiar et al [21] found an incidence of 1.02%.
- Prevalence of 0.8% with sex ratio of 2.5:1 was reported by another study in northern part of India by Bedi et al. [15] Women had lesser mean age of onset when compared to men in the study.
- Study by Wanniang N et al [1] showed the prevalence between 1% to 2%.

- Nail involvement is present in 50% to 88% of psoriasis patients, more so in patients suffering from psoriatic arthritis. Roughly 5% of patients have only nail disease with no skin involvement .[1]
- Polat A.et al [22] found 50-88% of individual suffering from psoriasis had concurrent nail involvement, with few cases of only nail involvement without cutaneous involvement.
- Similar study by Yorulmaz et al [23] showed prevalence of nail psoriasis to be 50 %.

To conclude the prevalence of psoriasis in India is between 0.44 to 2.8%, with nail changes seen in about 50% of cases .[24]

AGE OF ONSET-

Psoriasis has bimodal presentation and can be of two types - Type I occurs early in life and is strongly linked with HLACw6 with familial aggregation. It occurs between 15– 40 years and constitutes greater than 75% of the cases. Type II psoriasis occurs later in life, beginning above the age of 40, with a significant family history in 9.8-28% of the population. [25]

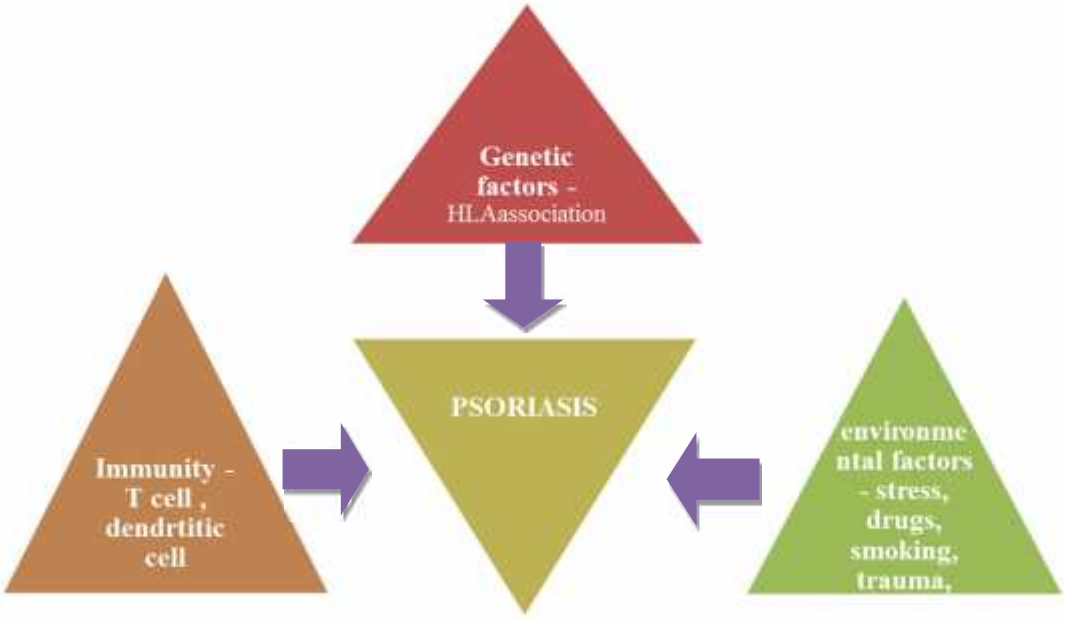
Psoriatic arthritis begins between 35 to 50 years affecting both sexes equally. Approximately 70% of the patients develop psoriasis prior to arthritis; in 15% patients arthritis starts more than a year prior to psoriasis, and in the rest 15% of the cases, both the conditions occur within 12 months.[26]

SEX RATIO-

Psoriasis has no sex distribution, affecting both the sexes equally [26]. However, Indian studies show a male dominance. [15, 16]

PATHOGENESIS OF PSORIASIS-

Multiple factors are involved in the origin of psoriasis. Genetically susceptible individuals on exposure to environmental influences lead to an immune imbalance, thereby leading to abnormal keratinization, hence causing typical psoriatic lesions. [27-29]



ROLE OF GENETIC FACTORS

Genetic factors play a major role in the causation of psoriasis. If one parent is suffering from psoriasis, the risk of the offspring to develop psoriasis is 16% and the chance is 50% if both parents have psoriasis.[25]Analysis has demonstrated 72% risk in

monozygotic twins versus 22% risk among dizygotic twins.[26] In a study done in North India, 9.8% of children had a history of psoriasis in family .[29]

Multiple HLA (human leukocyte antigen) haloptypes are related with psoriasis of which the presence PSORS1 region , a HLA Class I antigen on chromosome 6p is accountable for 35-50% of inheritability of the disease . The most probable gene in the PSORS1 loci is HLA-C-*06 which is crucial in antigen presentation, thus activating adaptive immune response in psoriasis.[30] Corneodesmosin (CDSN) gene is also present in the same area, encoding for a protein present in mature keratinocytes. PSORS1region, improper barrier function and adaptive immunity are the causative factors of psoriasis.[31]

Psoriatic patients have an association with HLA-B13, HLA-B17 and HLA-Bw16.[32]

Genes involved in causing inflammation like IL-23 signalling pathways and nuclear factor (NF) κB signaling, genes involved in regulating helper T cells immune responses have found noteworthy associations .[33, 34]

IMMUNE SYSTEM

Immune mechanisms play a pivotal role in the disease process. It is established by the presence of a significant number of activated T-cells and macrophages in the altered epidermis and dermis, and the response to immunosuppressive or immunomodulating therapy.[35]

(A) Antigen presenting cells [APC]

The APC like the Langerhans cells, dendritic cells, macrophages present the antigen to the naïve T cells thereby commencing the antigen dependent T-cell activation and proliferation. [36]

(B)T-lymphocytes dependent mechanisms

The formation and persistence of cutaneous lesion is maintained by infiltration of T-lymphocytes which is evidenced by – [35, 36]

Presence of activated T cells in the psoriatic lesions , soluble interleukin 2 receptor protein in blood which activates the T cells , increased expression of HLA-DR and interleukin (IL)-2 receptors , cytokine profile in psoriatic plaques is predominately of type-1 T Helper cells i.e.- IL-2, IFN-γ and TNFα, response of psoriasis to T-cell targeting therapies such as cyclosporine A, FK506, anti CD4 monoclonal antibody and a lymphocyte selective toxin .On histology it is evidenced that the activated dermal T lymphocytes infiltration is prior to the epidermal proliferation . [36]

(C) Polymorphonuclear leucocytes

The neutrophils have a significant role in causing psoriasis. There is a measurable increase in neutrophil functions like chemotaxis, degranulation, phagocytosis and bactericidal activity in psoriatic lesions in comparison to controls. [37]

(D)Epidermal Kinetics

The time for the basal germinative keratinocytes to complete one cycle is reduced to 100 hours as against the normal 200 hours .The time for basal

keratinocytes to reach upper layer is reduced to approximately 3 days versus the normal 13 days. [38]

Overall a hyper proliferating psoriatic epidermis takes about 4 days to complete the whole epidermal cell cycle, which is normally for about 26 days. [39]All the basal layer cells (100%) enter the cell cycle in psoriasis skin lesion which is only 60% in normal subjects.[40]

TYPE OF PSORIASIS

(A) Clinical Classification. [35]

Guttate psoriasis, chronic plaque psoriasis, exfoliative psoriasis, pustular psoriasis, psoriasis ungis, mucous membrane psoriasis, arthropathic psoriasis

(B)Regional variations in psoriasis: [35]

Scalp, Face, Eyes, Body flexures, Scrotum, Napkin area.

(C) Others [35]

Rupoid psoriasis, Elephantine psoriasis, Ostraceous psoriasis.

ANATOMY OF THE NAIL -

Nail or onyx is a hard horny structure mainly composed of protein keratin. It is the formed by the invagination of epidermis into the dermis. A healthy nail is whitish, smooth, and shiny without any ridges, pits or splits. It is translucent with pinkish color of the nail bed showing through it. A healthy nail is hard and stable because of the disulphide bond and flexible due to 15 – 25 percent water content. [9]

The nail can be divided into – nail plate, nail matrix, nail bed.

Nail plate –

It is rectangular, translucent with a curved surface consisting of matured keratinocytes of the nail matrix. It constantly multiplies throughout life and is adherent to the nail bed beneath which partly contributes to formation.[41] The nail plate is bound by nail folds which cover its proximal and lateral one- third margins. At the distal end, nail plate is free from the bed at the region called hyponychium. Nail plate appears pink due to the blood vessels of the bed beneath it. It has an opaque, white; half-moon shaped area called as the lunula .Lunula is prominent over the thumb nails and corresponds to the portion of the nail matrix which is visible .[41]

Transversally, the plate has three portions: (1) dorsal nail plate, (2) intermediate nail plate, and (3) ventral nail plate. The dorsal and the intermediate portions are formed by the matrix while the nail bed contributes to the ventral portion. [41, 42]

Proximal nail fold (posterior nail fold)-

It is formed by the 14 th week of embryogenesis, consisting of a dorsal and a ventral portion.[41] Proximal nail fold along with nail plate forms a layer which protects the matrix, and, if damaged, can cause permanent nail scarring.[43,44] The ventral part is not visible exteriorly and is in continuity with matrix and occupies roughly one-fourth the plate. The dorsal part is similar to the skin covering the digit dorsally but lacks pilosebeceous gland and is thinner. [45]

Cuticle or eponychium is the horny proximal fold and is strongly bound to the nail plate. [41] It strongly binds the plate to the nail fold and seals off the gap between the fold and the plate thus maintaining the homeostasis of nail.[46, 47]

Nail matrix -

It is a modified epithelium and forms the germinative part , having bigger keratinocytes proliferating at a faster rate in contrast to epidermal keratinocytes.[48] A large part of matrix contributes to nail plate formation through a process called onychokeratinization which occurs by accumulation of tonofilaments and absent granular layer .[41]

Longitudinally matrix appears as wedge shaped and consists of two portions: a proximal (dorsal) and a distal (ventral) portion. Keratinocytes of matrix matures and differentiates along a distally oriented diagonal axis and do not follow a vertical axis followed in epidermis. This is the reason why keratinization of proximal matrix cells gives rise to the dorsal plate and that of the distal matrix cells give rise to the intermediate nail plate. [41]

Cells present in nail matrix -

1. Keratinocytes - “Soft” or the cutaneous -type and “and hair-type or “hard” keratin are synthesized by matrix keratinocytes. It is the sole site having hard keratin protein mainly the Ha1 keratin.
2. Melanocytes – Matrix contains melanocytes in the lowest two cell layers. Matrix melanocytes contain the important enzymes that are needed for the production of melanin and are strongly DOPA positive in the distal end compared to the proximal end. They are quiescent normally and are stimulated

in many physiologic and pathological conditions producing diffuse or banded pigmentation of nail .[41,46]

3. Langerhans cells are present in more number in proximal matrix and fewer in to distal matrix. Presence and density of Merkel cells in the matrix is influenced by age, being greater in number in foetus compared to adult nails. Damage to cells of matrix is permanent and causes scarring.[41]

Nail bed -

It occupies area between distal ends of lunula to isthmus and is visible through plate. [41, 46] .The bed has 2-3 cells thick epithelium with a horny layer interlocking to the lower border of nail plate, thus providing a strong adhesion between the two tissues [46]. The cells differentiate distally and merge into the ventral part of plate. The dermis is rich in vascularity and is in continuity with periosteum distally. Connective tissue contains vascular structure, lymphatic, elastic fibers and fat cells. The bed is devoid of subcutaneous fat layer, follicles or sebaceous appendages .[46]

Biochemistry of the nails -

The nail unit contains proteins which can be categorized into:

1. Low-sulfur keratins (40–60 kda) or soft keratin
2. high-sulfur keratins (10–25kda) or hard keratin
3. High glycine-tyrosine matrix proteins (6–9 kda).

80 percent of dry weight is due to “hard” or high sulfur keratin. The epithelial keratins present are K5/K14, K6/K16, and K19.Matrix and the bed particularly contains K5/K14, K6/K16. [46]

PATHOGENESIS OF NAIL PSORIASIS

Psoriasis causes specific and nonspecific nail lesions affecting a part or the whole nail unit. The clinical signs depend to a large extent on the anatomical site and the severity of involvement with nails of fingers getting affected more often than the toe nails due to faster growth rate. Psoriasis changes are often studied under nail matrix or plate changes and bed changes.[8]

Study conducted by Zaias showed pitting as the frequently seen nail changes followed by discoloration of the bed, focal onycholysis, subungual hyperkeratosis & nail plate abnormalities.[47]

Nail matrix or nail plate involvement –

- Beau's lines, Pitting, onycholysis, leukonychia is due to proximal nail matrix involvement whereas focal onycholysis, nail plate thinning, red spots in the lunula and leukonychia results from involvement of distal nail matrix. Crumbling of nail plate occurs due to whole matrix involvement.

PITS –Pits are the most common finding among nail changes in psoriasis. Clinically they present as tiny, well defined depressions over the nail surface, more commonly affecting the finger nails than toe nails.[8]

These occur due to focal parakeratosis in proximal part of matrix due to abnormally keratinization. As the nail grows out beyond the proximal nail fold, the abnormal cells are lost to leave behind surface indentations that appear as pits.[47]

- Pits in psoriasis are small (< 1 mm in diameter) , shallow or deep seated, irregularly or randomly placed in most cases ,but in a few cases can be regular and uniform in a grid-like pattern called as thimble nails.[43]
- Ten or greater pits in each nail plate or 60 and more pits over all the nails is usually suggestive of psoriasis etiology .The distance of the pit from proximal part of nail fold indicates the duration of the psoriatic matrix lesion and the depth indicates the severity. Elkonyxis refers to the large sized pits in pustular psoriasis. [43] Transverse grooves occur similarly as pits if the lesion affects a larger area in the matrix.[8]
- Pitting of nails occur in lichen planus, parakeratosis pustulosa ,lichen nitidus, reiter's disease , secondary syphilis, pityriasis rosea, pemphigus vulgaris, alopecia areata ,vitiligo.[47]

Leukonychia - Refers to whitening of the nail because of involvement of nail matrix, clinically presenting as 1- 2mm wide bands. True leukonychia does not disappear on application of pressure on the plate and is a result of desquamation of parakeratotic cells in the intermediate and ventral matrices. The white hue is because of reflection of light over the plate on the sites of parakeratosis.[8,48]

Red spots in lunula -They appear as erythematous dots over lunula because of inflammation of the vessel wall leading to vessel dilation or change in blood composition in the intermediate or ventral nail matrix. [8, 49]

These usually represent an active psoriatic lesion with supra-papillary plate thinning and associated capillary dilatation. [43]

Crumbling of nail - Nail crumbling is due to entire nail matrix involvement; nail plate dystrophy, increased thickness of the plate and nail bed hyperkeratosis. Nail crumbling is an indication of chronic and/or severe nail psoriasis.[48]

Onychorrhexis and Beau's line -

Proximal part of matrix getting affected causes onychorrhexis and beau's lines.[47] Beau's lines present as transverse grooves and ridges and are due to transverse involvement of matrix associated with acute proximal nail-fold inflammation. [44] Onychorrhexis presents as longitudinal ridging with split in the nail due to corresponding longitudinal involvement in the matrix and inflammation of the matrix .It is observed in long standing psoriasis .[49]

Nail bed involvement-

"Oil drop sign" or salmon patch, onycholysis, splinter hemorrhages, subungual hyperkeratosis and nail discoloration are result of nail bed disease .Nail folds affection causes cuticle loss leading to paronychia.

Oil drop sign / Salmon patch – These represent a specific sign in psoriasis of nails. They appear yellowish-reddish due to psoriatic scales being compressed underneath the plate with imbibition of serum making them mimic as an oil drop placed on a paper. [8]

These focal , circumscribed lesions are because of the acanthosis & compact focal parakeratosis beneath the plate seen as yellow discoloration, over the the salmon-pink coloured bed due to psoriatic lesion.[3] Salmon patch is also seen in SLE and in acropustulosis.[46]

Onycholysis –Seen as a whitish discoloration distally or laterally and gradually advancing proximally toward the matrix associated with a characteristic erythematous margin around the onycholytic region. [48] Various pathogenesis has been put forth for onycholysis, such as

- Involvement of hyponychium due to extension of the disease from the nail bed followed by shedding of parakeratotic cells.[3]
- Detachment and accumulation of air beneath the plate giving it the characteristic whitish hue. [50]
- Abnormal keratinization at the hyponychium resulting in keratin accumulation thereby decreasing the adhesion between the plate and the bed .[48]

Splinter hemorrhages – Splinter hemorrhages are seen in 42% nails of fingers and 6% of toe nails and are the equivalent of an Auspitz sign in the nail.[46] These appear as thin linear structures, 2-3 mm long observed commonly in the distal part of the plate and are non-specific sign of nail psoriasis occurring because of damaged capillaries in the epidermal-dermal ridges.[8] Further, nail plate thinning and capillary fragility add on to the factors to develop these hemorrhages. [8] Eczema, vasculitis & infective endocarditis are the other conditions where these lesions are seen with traumatic nail being commonest cause to this entity.[3]

Subungual hyperkeratosis- It is because of accumulation of keratinocytes due to abnormal shedding of the cells from horny layer of the bed along with involvement of the hyponychium. It is prominently seen in toe nails. It is clinically seen as distinct thickening of the plate with separation from the underlying bed .[3] This entity also seen in Devergie's disease, eczema, onychomycosis, mycosis fungoides etc. [50]

Other changes -

Pseudofiber sign -

They appear as filamentous thin structures, black/ red in color either located proximally in the cuticle or beneath the hyponychium along the free end part of the plate and these are suggested to represent the bare capillaries underneath. [1]

Subacute/chronic paronychia-

Psoriatic paronychia is due to involvement of periungual regional skin with frequent involvement in patients with psoriatic arthritis. It presents as loss of cuticle and thickening of nail fold and detachment of fold from the plate allowing microorganisms, dirt or allergens entering beneath nail fold & exacerbating the inflammation. [8]

Nail apparatus relation to arthritis: the entheseal unit (complex) -

Nail forms an integral part of the entheseal complex (unit) as there is an intimate relation between the nail & the extensor tendon of the distal interplangeal joint at the micro-anatomical level. They are connected by the tendon of DIP joint that attaches distally to the DIP & has fibres between the matrix & the periosteum of the joint. Underlying involvement of the nail is a strong predictor of enthesitis. [51]

The involvement of nail and underlying DIP may be due to koebner response, analogous to the micro trauma or damage causing skin lesions. A micro-anatomical comparability is present between the skin and the enthesis: both integrate two different tissue types - in skin, the dermis and epidermis; in the enthesis, bone and fibrocartilage and a close functional integration between the nail and the joint and its

associated tendons and ligaments, which explains the known association between the nail disease and arthritis of DIP joint.[52]

Nail psoriasis as a predictor for Psoriatic arthritis -

Psoriatic arthritis (PsA), a psoriasis-related spondylo-arthropathy occurs in 20 - 30% of psoriasis patients. PsA patients have an increased disease associated morbidity and impairment in quality of life. It adds to a great deal of physical suffering, psychological trauma and ultimately economic burden of the disease to the individual and society. Thus a clinical indicator needs to be established to detect risk and ensure early detection of PsA. [51, 52]

Nail involvement, scalp affections and intergluteal/perianal psoriatic lesions have higher likelihood of developing PsA and are therefore regarded as main predictors of PsA.Nail changes is an early indicator of PsA .According to various studies affection of the nails were found in about 40 - 45 % psoriasis patient and 87 % of cases PsA patients .[51,52] As cutaneous disease often precede joint symptoms in about 75% of cases with PsA, the chances for early detection and treating PsA is greater .[50]

A cohort study of 1593 psoriatic patients for 30 years concluded that, psoriatic individual with nail changes had nearly 3 – 4 times greater chance to develop PsA, compared to patients having no nail changes .[52]

A prevalence study done for establishing clinical implications of nail disease in 661 psoriasis patients found an association between PsA and nail changes, with an Odd's ratio of 3.25 (95% CI, 2.16---4.90).[51] Various studies show that the most common nail change detected in PsA patients is pitting and onycholysis. [50]

PsA is a seronegative spondyloarthropathy which clinically presents as inflammation involving entheses (enthesitis) as the main feature. PsA presents as asymmetrical involvement of the small joints. Dactylitis, an inflammatory involvement of DIP joint presents as diffuse swelling of the DIP which is characteristic of PsA. [50]

ASSEMENT OF SEVERITY INDEX-

Various scoring systems are available to evaluate disease severity based on clinical features and quality of life. In clinical scoring systems the classical clinical psoriasis features such as scaling, erythema, and infiltration are graded along with body surface area affected. [8]

There are various scales to assessing severity of psoriasis such as body surface area (BSA), Salford index, Physician global assessment (PGA), Psoriasis area severity index (PASI), Psoriasis log - based area & severity index, etc. PASI is widely used scale of measurement due to its high validity .[8]

Limitation of PASI include –is a subjective score due to high inter observer variation , decreased sensitivity for milder disease and also does not evaluate quality of life impairment and comorbidities.[53]

PASI is not calculated in case of erythroderma and pustular psoriasis as the various parameters in the index are very different .Example - A patient of erythroderma with moderate erythema, scaling and mild induration could have a PASI of 24, same as the patient with chronic plaque psoriasis and with involvement of 10-30% of BSA, but with marked erythema, desquamation and induration. [52]

SCORING SYSTEM FOR NAIL PSORIASIS -

Various scoring systems for nail psoriasis assessment is

- ✓ Nail Psoriasis Severity Index (NAPSI),
- ✓ Targeted NAPSI
- ✓ Modified NAPSI,
- ✓ Psoriasis Nail Severity Score

NAPSI → A simple, objective, numeric, reproducible, grading system for nail changes in psoriasis that includes extent of involvement and location in the nail unit of the psoriatic pathologic changes.

Advantages of NAPSI- [6]

- ✓ Is an objective scale, easy to calculate, easily reproducible and sensitive to minor changes.
- ✓ Gives objective measurement with respect to clinical improvement or worsening of nails psoriasis and helps in guiding therapy and in clinical trial standardization.
- ✓ Also helps us to know which nail features respond better with treatment and aids in individualizing treatment.
- ✓ The NAPSI helps in following up of patients on trials and would aid in comparing different modalities of treatment.

ONYCHOSCOPY -

Lack of modalities to correctly diagnose nail disorders has caused the advent of onychoscopy as an important tool in diagnosing nail disorder. Routine modalities like potassium hydroxide examination and fungal cultures have less sensitivity and specificity to diagnose a nail disorder when compared to cutaneous. Radiological imaging modalities contribute very little in the diagnosing nail disease. Biopsy is infrequently performed for nail diseases as it is a painful procedure, due to apprehensions of patients and clinicians alike, lack of knowledge of the features seen histopathologically and lack of diagnostic criteria.

Onychoscopy or dermatoscopy of nail has come of age, which is increasingly being used by onychologists/dermatologist all over the world. It has emerged as a simple and superior modality in diagnosis. Earlier onychoscopy was primarily used for diagnosis of pigmented disorder, but recently it has found a wide application in evaluating infectious and inflammatory disorder as well.[54]

Dermoscopy -

Dermatoscope or dermoscopy, a noninvasive instrument that aids in diagnosis and helps to see minute clinical cutaneous lesions, disorders of hair, and various nail diseases not seen to the naked eye. [55, 56] It acts as bridge between macroscopic changes (i.e., clinical features) and microscopic changes (i.e., histopathological features).[5]

Onychoscopy is the nail examination using dermoscope. It helps to examine nail and its parts – like the nail folds, hyponychium, nail plate & bed. [5]

Types of dermoscopes

1. **Handheld dermoscopes:** The handheld dermoscopes are used as either in contact with the skin surface or examining surface. The standard magnification of these handheld dermoscopes is (×10).[57]
2. **Basic digital dermoscopes and photographic equipment:** Digital dermoscopes are used by connecting to computer (via USB) or camera or an iPhone. The magnification is (×10 to ×80). They have an advantage of higher magnification and picture capturing options, but lack adequate light source. [57]
3. **Advanced digital dermoscopes: -** Digital dermoscopes (video dermoscopes) take high-magnification, high-quality photographs and are expensive with the prices based on software's used. This type of digital dermoscope offers multiple magnifications from lower to higher range of (×20 to ×70 or ×100).[57]

Modes of dermatoscopy –

Three modes of dermoscopy are- [58]

1. Non-polarized mode, contact
2. Polarized mode with contact
3. Polarized mode with non-contact.

Polarized light reduces skin surface reflection, and hence helps in visualizing deeper skin structures, while non-polarized light gives information about the superficial skin. [59]

PREREQUISITES AND TECHNIQUE OF ONYCHOSCOPY - [5]

- Knowledge about anatomy of nail is required as it aids in making final diagnosis. Handheld dermatoscopes although give clearer images, the images are of lesser magnification (x10) and hence cannot be used to examine blood vessels arrangement and anatomy accurately. Video dermatoscopes on the other hand are versatile devices capable of providing much higher magnifications (×200) though resolution may be suboptimum.
- Onychoscopy should be placed subtly on the examining digit resting on a hard, dull surface .Excess of pressure should not be applied on the examining digit to avoid blanching of the vessels. Nails have to be cleaned with acetone/spirit to remove debris, dirt or external applications.
- Nail examination can be performed by "contact" or “non-contact" method or by "wet examination" and "dry examination".
- The whole nail may not be visible in one field in case of contact method. The instrument needs to be moved and aligned appropriately to examine all parts. This method visualizes features like pitting, leuconychia, hemorrhages well.
- The non-contact method is where the dermoscope is held away from the surface to visualize the nail in a single field and features such as yellowish discoloration of the nail, dystrophy of the nail, beau’s line and subungual hyperkeratosis and nail fold capillary flow and architecture are better seen on non-contact method.
- Initial examination is a “dry examination” with no interface medium used. Nail plate changes are better visualized.
- “Wet examination” refers to using an interface medium such as water based gels (e.g., ultrasound gel), antiseptics (e.g., alcohol itself or alcohol based hand

sanitizers) or oils (e.g., mineral oil) .This helps in better penetration of the light and makes the plate more transparent, thereby providing better imaging of the bed changes .

- Surface abnormalities are better examined using the non-polarized light while the polarized form highlights bed changes.

Procedural constraints [5]

Non visualization of whole nail in single field because of the convex curvature of the nail surface , hardness makes onychoscopy challenging, requiring frequent focus changes and adjustment of angle .Capturing images of different parts especially the distal part is often difficult due inability to focus clearly .Contact method of examining is more challenging as the lens surface cannot directly touch the nail surface because of the curvature and hard nature of the nail .

Advantage of onychoscopy –

- It's an easy to use and noninvasive tool for enhancing the visible nail features.
- It helps to visualize additional unique changes not seen through unaided eyes. It helps in confirming of diagnosis for example –onycholysis will have an erythematous border around the onycholytic region, seen using dermoscopy hence differentiating it from onycholysis on non-psoriatic origin.
- It helps in grading response to treatment and prognosis.

MATERIALS AND METHODOLOGY

The details of the methodology are described below:

- **Study source:** The study was conducted in the Department of Dermatology, Venereology and Leprosy, in tertiary care hospital, Belgaum as a part of the MD academic curriculum.
- **Study duration :** The study was conducted between 1st January 2019 to 31st December 2019
- **Ethical clearance:** Clearance was taken from the Ethical Committee of the institute.
- **Study design:** Hospital based cross sectional study
- **Sample size:** Based on previous records of patients having psoriasis with nail changes who had attended the outpatient department of Dermatology, Venereology and Leprosy in the previous year, a sample size of **60** was calculated. However, the total number of patients attending the OPD during the study period was 60; hence a sample size of 60 was studied.
- **Sample selection criteria:** All patients with clinically diagnosed cases of psoriasis attending dermatology OPD were enrolled as per the inclusion & exclusion criteria.
- **Inclusion criteria:** All consenting patients, irrespective of age , sex with diagnosed psoriasis disease with nail changes attending the department of dermatology, between 1st January to 31st December 2019.

Exclusion criteria:

1. Patient having congenital and acquired nail disorder.
2. Nail changes secondary to dermatological condition other than psoriasis

Data collection :

1. Data was collected by a single examiner and recorded in case record proforma after taking an informed consent of all the patients participating in the study .
2. Detailed history regarding the age, sex, family history, personal habits, duration of the disease, joint involvement was noted .
3. General physical, systemic and dermatological examination was carried out and noted
4. Diagnosis of psoriasis was made based on clinical examination of the lesion and confirmed by biopsy in doubtful cases.
5. The cutaneous involvement was calculated using the PASI scoring system.
6. The nail changes of all the finger and toe nails were scored using NAPSI scoring system with appropriate clinical photographs
7. Dermoscopic/onychoscopy examination of the nails was performed using a video-dermatoscope (Dinolite premier AM4113ZT model) providing 50X and 200X magnification with relevant photographs .
8. The nail changes observed on dermatoscopic examination was scored using the NAPSI scoring system.
9. Additional nail changes on clinical and dermatoscopic examination were noted in the proforma.

STEPS TO CALCULATE PASI –[38,53]

1. Four sites, i.e. upper limb (u), head, trunk and the lower limbs (l), are scored individually by three parameters- induration, erythema & desquamation. Each of this parameter is graded from 0 to 4, where 0 is nil, 1 is mild, 2 is moderate, 3 is severe , 4 is very severe, to get a lesion sum score of A1 for head ,A2 for upper limb, A3 for trunk and A4 for lower limb respectively .
2. The percentage of involvement in the areas affected is calculated as: 1→< 10% area; 2 →10 to 29%; 3 → 30 to49%; 4 →50 to 69%; 5→ 70 to 89%; 6 → > 90% which is multiplied with the lesion sum score of that particular area to get a score of B 1 for head, B 2 for upper limb, B 3 for trunk and B 4 for lower limb respectively.
3. Head & neck, upper limbs, trunk, and lower limbs represent around 10%, 20%, 30% and 40% of the BSA respectively. These sites are given corresponding weightage by multiplying the scores by 0.1; 0.2; 0.3 and 0.4 respectively thus each of area scores (B) are multiplied by the correction factor for that particular area- B1 *0.1 for head, B 2* 0.2 for upper limb 3* 0.3 for trunk and B 4* 0.4 for lower limb to get a score of C1, C2, C3, C4 respectively.
4. The final PASI score is obtained by the sum total of C1, C2, C3, and C4.

The final PASI score ranges from 0 → 72.

Steps for calculating NAPSI-[6]

1. Every nail is divided by longitudinal & horizontal lines, thus dividing it into 4 quadrants. In each quadrant a score is given for bed changes , from 0 → 4 and for matrix changes from 0 → 4 .Every quadrant is examined for matrix

changes i.e leukonychia, pitting, red spots in lunula & crumbling .A score from 0 - 4 is given depending on the number of quadrants involved .

2. 0 for none, 1→ if one quadrant involved ; 2→ if 2 quadrants involved; 3 → if present in 3 quadrants, and 4 → if present in 4 quadrants.
3. Bed changes are scored on the presence following features- splinter hemorrhages, onycholysis, subungual hyperkeratosis, salmon patch/"oil drop". 0 for none, 1→ if present in one quadrant; 2→ if 2 quadrants involved; 3 → if present in 3 quadrants, and 4 → if present in 4 quadrants.
4. Combination of matrix score and a score of nail bed gives the total score of that nail which ranges from 0 →8.
5. Likewise each nail is scored and sum of scores of all the nails gives the final NAPSI score that ranges from 0 to 80 for all finger nails and from 0 to 160 if even toe nails are included.

Statistical Method for Data Analysis:

Data is analyzed using statistical software R 3.6.3 and Excel. Kappa statistical test was used for testing the level of agreement of clinical and onychoscopy NAPSI. Independent t test/ Mann Whtiney U test was done to compare groups for continous variables. Karl Pearson's chi square and correlation coefficient method were used for association between attributes wherever applicable.

DISCUSSION

The present study is a hospital- based cross sectional study conducted over a period of 12 months from January 2019 to December 2019 in the Department of Dermatology, Venereology and Leprosy, KLE'S Dr. Prabhakar Kore Hospital and Medical Research Centre, Belagavi.

60 psoriasis patients with nail changes who met the inclusion criteria were selected for the study.

In the study, patients of different types of psoriasis with nail changes were studied. Their age ranged from 19 to 88 years. Diagnosis of psoriasis in most cases was made on clinical grounds and scored using PASI scoring system. All 20 nails of patients were examined, appropriate photographs taken and scored according to NAPSI scoring system on clinical examination. The nail changes were examined, scored using NAPSI scoring system, photographed using a video-dermatoscope (Dinolite premier AM4113ZT model) providing 50X and 200 X magnifications. Records were compiled and data analyzed.

Our study was similar to a study by Wanniang N et al[1] who compared and correlated the clinical and dermoscopic nail changes in 50 adult psoriasis patients.

Out of the 60 patients recruited, 68.33% (41/60) were male and 31.67 %(19/60) were female. The sex distribution in our study showed male predominance (68.33%) compared to study done by Wanniang N et al [1] (76%) , Rajashekhar S et al [60] (64.6 %) and Yadav T A et al [61] (73.91%) .

The age in our study ranged between 19 -88 years and was comparable with the study by Wanniang N et al [1] (12 – 66 years) and Shanavaz AA et al [24] (26 – 70 years). The mean age of the patients in our study was 48.92 years which is nearly similar to studies done by Wanniang N et al [1] (45.02 years) and Shanavaz AA et al [24] (44. 2 years).

The mean duration of onset of psoriasis in our study was 9. 45 years which was comparable with study done by Rajashekhar S et al [60] (7.321 years) and Polat A et al [22] (10.43 years).Studies by Wanniang N et al [1] , Shanavaz AA et al [24] however had lesser duration of onset being 4.94 and 4.31 years respectively.

In our study 85% (51/60) patients presented with chronic plaque type of psoriasis which was comparable to the study by Wanniang N et al [1] (80%) and Rajashekhar S et al [60] (64.6%). The least common presentation was erythrodermic and guttate type of psoriasis - 1.67 % each (1/60) which corresponded with study done by Wanniang N et al [1] (4 % and 2 % respectively) and Rajashekhar S et al [60] (1.5 % each respectively).

In our study 51.67 % (31/60) of the patient had joint complaint with a mean duration of joint complaint of 3.92 years as compared to study by Rajashekhar S et al [60] where a higher incidence of 67.7% of study population had joint complaints. According to study by Shanavaz AA et al [24] joint involvement was detected in 15.78% (3/19) patients which are much lower compared to our study. This variation may be due to reduced sample size. Another study by Yorulmaz A et al [23] found that joint involvement was observed in 20.9% (14/ 67) patients. This variation may be due to the facts that study by Yorulmaz A et al [23] included on 67 patients with overt clinical features of nail changes in psoriasis.

The mean PASI score in our study was 9.27 in comparison to study by Daulatabad D et al [62] and Polat A et al [22] with mean PASI score of 14.4 and 10.61 respectively.

The mean clinical NAPSI score in our study was 34.42; while in study by Rajashekhar S et al [60] mean clinical NAPSI score was 30.1. Study by Wanniang N et al [1] it was 23.82 and in study by Polat A et al [22] it was 21.10, much lesser than the findings in our study.

The mean onychosopy NAPSI was 44.0 in our study, 26.68 in study by Wanniang N et al [1] and 20.87 in a study by Polat A et al [22]. In our study 51.67% (31/60) patients had greater or equal to 40 as the NAPSI score, while 48.33% (29/60) patients had NAPSI score lesser than 40.

A statistically significant difference was observed in clinical and onychoscopy NAPSI scores for gender. Males had a higher mean NAPSI on both clinical and onychoscopy examination implying that males had more nail changes compared to females. Study by Polat A et al [22] showed no statistical difference between the clinical and onychoscopy NAPSI for gender.

Finger nails were more frequently affected than toe nails in our study, on both clinical and onychoscopy examination compared to study by Rajashekhar S et al [60] which showed similar findings. Study by Daulatabad D et al [62] showed a slight higher frequency of toe nails involvement when compared to finger nails . Additionally we found that mean NAPSI on onychoscopy was statistically higher for both finger nails and toe nails when compared to mean NAPSI on clinical examination.

In our study we compared NAPSI score according to type of psoriasis. We found on clinical examination, mean NAPSI of 69.00 to be highest in erythroderma patient (1/60) followed by mean of 35. 67 in chronic plaque psoriasis (51/60) patients. On onychoscopy examination, mean NAPSI score of 88.00 was found in erythroderma (1/60) case followed by mean of 44.71 in chronic plaque psoriasis (51/60) patients. Multiple subtypes of psoriasis was recruited in our study , comparisons with other study was difficult as most of them had studied nail changes in chronic plaque type of psoriasis or did not study this correlation .

In our study by using the independent t-test for comparison between the clinical and onychosopy NAPSI score showed that onychoscopically evaluated NAPSI score was statistically significantly higher ($P < 0.05$) than the clinically evaluated NAPSI score which was similar to the result obtained by Wanniang N et al [1] and Yorulmaz A et al [23] .While study by Polat A et al [22] showed no statistically significant difference between the clinical NAPSI score and the onychoscopy NAPSI score ($p>0.85$).

By Karl Pearson's correlation coefficient method it was found that there was a statistically significant correlation between the PASI score and NAPSI score clinically (p value - 0.0177) and NAPSI score on onychoscopy (p value - 0.0111) compared to study by Wanniang N et al [1] . Similar significant correlation was found in study done by Yorulmaz A et al [23] and Rajashekhar S et al [60].

In our study there was no statistically significant correlation between the duration of the disease with PASI score, NAPSI score clinically and NAPSI score on onychosopy. However there was a weak correlation observed between the duration of psoriasis and the NAPSI score on onychoscopy by Wanniang N et al [1.]

In our study pitting was the most common nail change found on clinical and onychoscopy examination (90 % patients on clinical examination and 95% patients on onychoscopy examination) which is compared to study by Wanniang N et al[1] (16% patient on clinical and onychoscopy examination each) , Yadav T A et al [61] (39.1 % on onychoscopy examination) and Polat A et al[22] (92.5 % on clinical examination , 77.5 % on onychoscopy examination)

Pitting was found in 90 %(54/60) patients on clinically examination and 95% (57/60) patients on onychoscopy examination in our study comparable to study by Wanniang N et al[1] (84 % on clinical and 84 % on onychoscopy examination) and Polat A et al [22] (92.5 % on clinical and 77.5 % on onychoscopy examination) . There was no significant statistical difference found between the two methods for examination of pits in our study compared to study by Wanniang N et al[1].

48.33% (29/60) and 78.33% (47/60) patients revealed leuconychia on clinical and onychoscopy examination in our study comparable to Polat A et al [22] who had higher incidence of leuconychia (82.5 % on clinical and 92.5 % on onychoscopy examination.) Study by Wanniang N et al [1] showed only 20% of the patient had leuconychia on clinical examination and 22 % on onychoscopy examination of leuconychia. In our study we found a statistically significant relation between the two methods inferring that onychoscopic examination better visualized leuconychia nail changes when compared to clinical examination.

A significant occurrence of crumbling of nails were found in 55% (33/60) on clinical examination 53.33% (32/60) on onychoscopy examination in our study compared to study by Wanniang N et al [1] (14% on clinical and 16 % on onychoscopy

examination) and Polat A et al [22] (17.5 % on clinical and 20 % on onychoscopy examination)

In our study red spots in lunula was found in 20 %(12 /60) patients on clinically examination and 30 % (18 /60) patients on onychoscopy examination as compared to study by Wanniang N et al [1] (0 % on clinical and 8 % on onychoscopy examination) and Polat A et al[22] (5 % on clinical and 5 % on onychoscopy examination) who had much lower finding of red spots in lunula in their study . We found a statistically significant relation between the two methods inferring that onychoscopic examination better visualized red spots in lunula when compared to clinical examination.

Onycholysis , second common feature observed on onychoscopy was found in 55 %(33/60) patients on clinical examination and 80% (48 /60) patients on onychoscopy examination in our study which is comparable to study by Wanniang N et al [1] (54 % on clinical and 54 % on onychoscopy examination) and Polat A et al [22] (67.5 % on clinical and 77.5 % on onychoscopy examination) . We found that onycholysis was significantly better noted by onychoscopy than on clinical examination.

Subungual hyperkeratosis, the second common feature observed on clinical examination was found in 81.67 % (49/60) patients on clinical examination and 76.67 % (46/60) patients on onychoscopy examination in our study. Study by Wanniang N et al [1] found a lower incidence of subungual hyperkeratosis in 40 % on clinical examination and 46 % on onychoscopy examination. Polat A et al [22] also reported a lower incidence of 35 % patients on clinical and 32.5 % patients on onychoscopy examination.

In our study oil drop sign was found in 18.33 %(11 /60) patients on clinically examination and 23.33 % (14/60) patients on onychoscopy examination which is much lesser than the study by Wanniang N et al [1] (32 % on clinical and 44 % on onychoscopy examination) and Polat A et al [22] (42.5 % on clinical and 47.5 % on onychoscopy examination) .

Splinter hemorrhages were found in 30 % (18 /60) patients on clinical examination and 61.67 % (37 /60) patients on onychoscopy examination. Study by Wanniang N et al [1] found splinter hemorrhages in 8 % on clinical examination and 62 % on onychoscopy examination . Polat A et al [22] found in 75 % patients on clinical and 80 % patients on onychoscopy examination.

Additional findings which were not included in NAPSI scoring were noted during the clinical and onychoscopy examination. On clinical examination, the most common additional feature observed was longitudinal striations, seen in 48.33% (29 /60) compared to study by Rajashekhar S et al [60] (30.8%) and Polat A et al [22] (62.5 %). The second common additional feature observed in our study was Beau' s line , seen in 33.33% (20/60) patients compared to study by Rajashekhar S et al [60] (21.5 %) . Study by Polat A et al [22] observed Beau's line in only 2.5 % of the study population.

On onychoscopy examination, the most common additional feature observed was longitudinal striations, seen in 53.33% (32 /60) higher than the study by Polat A et al [22] (20 %) and Wanniang N et al [1] (4 %). The second common additional feature observed in our study was Beau' s line , seen in the same 33.33% (20/60) patients as clinical examination compared to study by Wanniang N et al [1] (22%) . Study by Polat A et al [22] observed Beau's line is only 5 % of the study population. Longitudinal

melanonychia was observed in 18.33% (11/60) in our study compared to study by Wanniang N et al [1] where 10 % of the patient had longitudinal melanonychia.

Our study thus indicates that the NAPSI scoring system for clinical examination and onychoscopy examination can be interpreted together to obtain better evaluation of nail changes in psoriasis .The strength of our study lies in highlighting the onychoscopic features and the clinical correlation of common nail changes in psoriasis patient and establishing a correlation between disease severity (PASI) and nail disease severity (NAPSI).

The limitation of our study includes small study population, lack of age, sex matched control group and lack of study of nail bed capillary change in psoriasis.

CONCLUSION

We conducted the above study to demonstrate the effectiveness of onychoscopy in detecting nail changes in psoriasis and its correlation with clinical examination of nail using a standard scoring system – NAPSI. Also correlation between severity of cutaneous disease using PASI scoring system and nail severity using NAPSI scoring system was established.

A total of 60 patients with psoriasis were recruited in our study and their nail changes studied. Our study showed male predominance, male to female ratio of 2.15:1 with mean age of 48.92 years. The mean duration of onset of psoriasis in our study was 9. 45 years. The most common type of psoriasis in our study was chronic plaque type of psoriasis. Half of study population had joint complaint.

The mean PASI score mean clinical NAPSI score and mean onychoscopy NAPSI score in our study was 9.27, 34.42, and 44.0 respectively in our study. Males had a higher mean NAPSI on both clinical and onychoscopy examination implying that males had more nail changes compared to females. Finger nails were more frequently affected than toe nails in our study, on both clinical and onychoscopy examination.

Onychoscopically evaluated NAPSI score was statistically significantly higher compared to the clinically evaluated NAPSI score proving that onychoscopy examination to be a better method for evaluation of nail changes .

There was a positive correlation between the PASI score and the NAPSI scores by both methods proving that more the cutaneous involvement, higher was the extent of nail involvement

Pitting was the most common nail change found on clinical and onychoscopy examination followed by subungual hyperkeratosis on clinical examination and onycholysis on onychoscopy examination as the second common nail feature. Leuconychia, red spots in lunula, onycholysis and splinter hemorrhages were better visualized on onychoscopy examination.

Most common additional feature observed both on clinical and onychoscopy examination was longitudinal striations, followed by beau's line, although these additional features were better visualized on onychoscopy examination.

Hence onychoscopy examination should be included as routine method for diagnosing nail disorder as it aids in better visualizing the nail changes compared to clinical examination which may evade the need for biopsy. Onychoscopy acts as a highly accurate and sensitive method for detecting subtle nail changes. It also acts as a tool in assessing the progression of the disease and the response to treatment.

Perhaps, more studies with larger sample size will help to standardize the onychoscopy findings of nail changes in psoriasis.

SUMMARY

This was a hospital based cross sectional study carried out from to 1st January 2019 to 31st December 2019. The source of data were patients with clinically diagnosed psoriasis attending the dermatology OPD , at KLE'S Dr. Prabhakar Kore hospital, Belagavi. All consenting patients having psoriasis with nail changes were recruited. The exclusion criteria were patients having congenital and acquired nail disorder and nail changes secondary to dermatological condition other than psoriasis

The objective of the study was to find correlation between the onychoscopy nail changes with clinical severity of nail changes through NAPSI scoring and to correlate the extent of cutaneous severity using PASI score with nail severity using NAPSI scoring system.

The sample size was 60 patients. A detailed history was asked with systemic & dermatological examination carried out. Clinically diagnosed cases of psoriasis were recruited and the disease severity was scored using PASI scoring system. Clinical examination of the nails was noted, scored using NAPSI system and relevant pictures were recorded. Dermoscopic/onychoscopic examination of the 20 nails was performed using a videodermatoscope- Dinolite premier AM4113ZT model and onychoscopic images were recorded. The data was noted in a pre-designed profoma after taking informed and written consent. The results were tabulated and analyzed using appropriate statistical method.

The male to female ratio in our study was 2.15:1 with more males suffering from the psoriasis. The most common age group affected was between 41-50years (40%) with mean age of 48.92 years noted in our study. The mean duration of psoriasis in our study was 9. 45 years. The most common type of psoriasis in our study was chronic plaque type of psoriasis (85%).

Males had a higher mean NAPSI on both clinical and onychoscopy examination implying that nail involvement was more frequent in males compared to females. Finger nails were more frequently affected than toe nails in our study, on both clinical and onychoscopy examination.

NAPSI score was higher by onychoscopy method of examination when compared to clinically evaluated NAPSI score proving that onychoscopy examination of nails visualized the nail changes more effectively. We also noted a positive relation between the cutaneous severity and extent of nail involvement.

Pitting was the most common nail change found on clinical and onychoscopy examination. Leuconychia, red spots in lunula, onycholysis and splinter hemorrhages were better visualized on onychoscopy examination. Most common additional feature observed both on clinical and onychoscopy examination was longitudinal striations, followed by beau's line, although these additional features were better visualized on onychoscopy examination.

Hence onychoscopy acts as a more efficient tool in visualizing subtle nail changes when compared to clinical examination and is an effective tool of assessing the nail disease activity.

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ANNEXURE-I-ETHICAL CLEARANCE LETTER

K.L.E. ACADEMY OF HIGHER EDUCATION AND RESEARCH
(Deemed – to- be- University)
Accredited 'A' Grade by NAAC (2nd Cycle) Placed in Category 'A' by MHRD (GoI)
JAWAHARLAL NEHRU MEDICAL COLLEGE,
NEHRU NAGAR, BELAGAVI-590010 (KARNATAKA-INDIA)
Website: http//www.jnmc.edu
E-Mail : dome@jnmc.edu
Phone: (+91-(0)831 Office : 2472550
Principal: 2471701
Fax No. +91 (0)831 – 2470759

Ref: MDC/DOME/49 **Date: 24/11/2018**

To,

REG NO. : BT0118002

Sub: Institutional Ethical Clearance for the study.

With reference to the above, we wish to inform you that your proposed research project titled **"CROSS SECTIONAL STUDY TO CORRELATE CLINICAL SEVERITY OF NAIL CHANGES USING NAPSI SCORING AND DERMOSCOPIC NAIL CHANGES IN PATIENTS OF PSORIASIS"**, is ethical and justifiable. The proposed research project has been cleared by the JNMC Institutional Ethics Committee on Human Subjects Research.

(Dr. Arathi Darshan)
Member Secretary
JNMC Institutional Ethics Committee
on Human Subjects Research,
J.N.Medical College, Belagavi.

(Dr. Roopa M Bellad)
Chairman,
JNMC Institutional Ethics Committee
on Human Subjects Research,
J.N.Medical College, Belagavi.

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ANNEXURE - II

INFORMED CONSENT FORM

I.D.NO. | | | |

Title of the study: Cross sectional study to correlate clinical severity of nail changes using NAPSI scoring and dermoscopic nail changes in patients of psoriasis.

The study is conducted by **_____,** Post Graduate (M.D) student in Dermatology under the guidance of **_____,** Professor and Head, Department of Dermatology, Venereology and Leprosy, JNMC, BELAGAVI.

Respected Sir/Madam,

We invite you to participate in our study as, you are eligible for the same. During the study you will be asked some questions in detail regarding your present complaints.

Purpose of the study:

Psoriasis is associated with certain changes is the nails which are often missed out and can be seen using an instrument called dermatoscope. Hence this study intends to observe those changes/findings using the dermatoscope, score using NPASI system and correlate with clinical score. You are being requested to participate in this study because you have been diagnosed to have psoriasis with nail changes.

Procedure:

You will be asked to give a detailed history of your disease, undergo a physical examination and onychoscopic examination.

Risks and Benefits:

The result of you taking part in this research would help health care providers towards a better understanding and diagnosis of this disease, and thus we will be able to provide improved patient care.

Alternatives:

If you decide not to participate in this study, you will still be receiving the usual standard care for your disease.

Privacy and confidentiality:

Your privacy will be respected and all information collected about you during the course of this study will be kept confidential. Your identity will remain undisclosed.

Relations with the Institutional policy:

The J N Medical College will provide, within the limitations of the laws of the State of Karnataka, facilities and medical attention to patients who suffer injuries as a result of participating in this project.

Financial incentives:

You shall not be receiving any payment or any financial incentives for participating in this study.

Authorization to publish results:

The results of this study may be published for scientific purpose or presented to a scientific group. Your identity, however, will be maintained confidential at all times.

Voluntary participation:

In case you need further information regarding your rights as a study participant, you may please contact DR.ROOPA M BELLAD**,** chairman of the ethical committee, J N Medical College, Belagavi.

STATEMENT OF CONSENT

I.D.NO: | | | |

I Mr/Ms/Mrs ---------- volunteer and consent to participate in this study. I have read the consent document or it has been read to me in my vernacular language. I accept to participate in the study. All the information regarding this study is provided to me and I have understood the same. I have been given the opportunity to ask questions and obtain appropriate answers.

Participant's name:

Signature or left thumb print of participant:

Witness name:

Signature of witness:

Signature of the investigator:

Date:

ANNEXURE-III

PSORIASIS PROFORMA

TITLE – "Cross sectional study to correlate clinical severity of nail changes using NAPSI scoring and dermoscopic nail changes in patients of psoriasis."

Case no

Date-

Name-

Age- **DIAGNOSIS:**

Gender-

PRESENTING COMPLAINTS:

HISTORY OF PRESENT ILLNESS:

1.	Onset	□ Sudden	□ Gradual
2.	Progression	□ Progressive	□ Stationary
3.	H/o erythema	□ Present	□ Absent
4.	H/o stress and strain	□ Present	□ Absent
5.	H/o joint involvement	□ Present	□ Absent
6.	H/o remissions & exacerbations	□ Present	□ Absent

7. Duration of the disease -

Initial lesion: Erythema Red papules Pus filled

Associated factors: Itching Pain Asymptomatic

MUCOCUTANEOUS EXAMINATION:

A)**Types of lesions**-

1)Papules	Present	Absent
2)Plaque	Present	Absent
3)Pustules	Present	Absent
4)Erythema	Present	Absent

B)**Distribution**-

Symmetrical Asymmetrical Localised Generalised

C)**Sites of lesions**:

Scalp	Present	Absent
Extensor aspect upper limbs	Present	Absent
Extensor aspect lower limbs	Present	Absent
Flexors of upper limbs	Present	Absent
Flexors of lower limbs	Present	Absent

J)**Nail lesions:**

Nail matrix changes -

1)Pitting	Present	Absent
2)leukonychia	Present	Absent
3)Nail plate thickness and crumbling	Present	Absent
4)red spots in lunula	Present	Absent

Nail bed changes -

1)Subungual hyperkeratosis	Present	Absent
2)Onycholysis	Present	Absent
3)Splinterhaemorrhages	Present	Absent
4)Oil drop or salmon patch	Present	Absent

5)Beau's lines Present Absent

6)Yellow discolouration Present Absent

K)**Joint involvement**: Present Absent

If present, involved joint(s) with duration -

 Distal interphalangeal - Proximal interphalangeal - Sacroiliac

 Metacarpophalangeal joint Knee joint elbow joint

 wrist joint

L**)Mucosal Examination:**

a)Oral lesion Present Absent

b)Genital lesion Present Absent

PASI SCORE-

NAPSI SCORE-

Signature

PASI SCORING –

PLAQUE CHARACTERISTIC	LESION SCORE	HEAD (A1)	UPPER LIMB(A2)	TRUNK(A3)	LOWER LIMB (A4)
ERYTHEMA	0=NONE 1= MILD 2= MODERATE 3= SEVERE 4= VERY SEVERE				
INDURATION					
SCALING					
TOTAL (A)					

% AREA AFFECTED	AREA SCORE (B)	HEAD B1 = A1 * B	UPPER LIMB B2 = A2* B	TRUNK B3=A3* B	LOWER LIMB B4 = A4*B
0 = 0% 1 = 1% - 9% 2 = 10% - 29% 3 = 30% - 49% 4 = 50% - 69% 5 = 70% - 89% 6 = 90% - 100					
TOTAL (C)					

BODY SURFACE AREA	HEAD D1 = C1* 0.1	UPPER LIMB D2 =C2* 0.2	TRUNK D3 =C3* 0.3	LOWER LIMB D4 =C4* 0.4
TOTAL				

PASI SCORE – D1 +D2 + D3 + D4 =

NAIL PSORIASIS SEVERITY INDEX (NAPSI) OF FINGER NAILS ASSESED CLINICALLY

Right Hand : affected nail matrix (pitting, leukonychia, red spots in the lunula, crumbling) O — no signs, 1 — signs are present in one nail quadrant, 2 — signs are present in two nail quadrants, 3 — signs are present in 3 quadrants , 4- signs are present in 4 quadrants .	
Nail of thumb	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of index finger	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of middle finger	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of ring finger	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of little finger	☐ 1 ☐ 2 ☐ 3 ☐ 4
Right hand : affected nail bed (onycholysis, subungual hyperkeratosis, hemorrhages, "oil drops "/ "salmon-spot sign ") 0 — no signs, 1 — signs are present in one nail quadrant, 2 — signs are present in two nail quadrants, 3 — signs are present in three nail quadrants, 4 — signs are present in four nail quadrants.	
Nail of thumb	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of index finger	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of middle finger	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of ring finger	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of little	☐ 1 ☐ 2 ☐ 3 ☐ 4
Left hand : affected nail matrix (pitting, leukonychia, red spots in the lunula, crumbling) O — no signs, 1 — signs are present in one nail quadrant, 2 — signs are present in two nail quadrants, 3— signs are present in 3 quadrants,4- signs present in 4 quadrants	
Nail of thumb	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of index finger	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of middle finger	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of ring finger	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of little finger	☐ 1 ☐ 2 ☐ 3 ☐ 4
Left hand : affected nail bed (onycholysis, subungual hyperkeratosis, hemorrhages, Oil drops/ "salmon—spot sign 0 — no signs, 1 — signs are present in one nail quadrant, 2 — signs are present in two nail quadrants,3 — signs are present in 3 nail quadrants ,4- signs present in 4 quadrants	
Nail of thumb	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of index finger	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of middle finger	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of ring finger	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of little finger	☐ 1 ☐ 2 ☐ 3 ☐ 4
NAPSI result	

NAIL PSORIASIS SEVERITY INDEX (NAPSI) OF TOE NAILS ASSESED CLINICALLY

Right feet : affected nail matrix (pitting, leukonychia, red spots in the lunula, crumbling) O — no signs, 1 — signs are present in one nail quadrant, 2 — signs are resent in two nail quadrants, 3 — signs are present in 3 quadrants ,4- signs present in 4 quadrants . .	
Nail of great toe	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of second toe	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of third toe	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of fourth toe	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail little toe	☐ 1 ☐ 2 ☐ 3 ☐ 4
Right feet : affected nail bed (onycholysis, subungual hyperkeratosis, hemorrhages, "oil drops "/ "salmon-spot sign ") 0 — no signs, I — signs are present in one nail quadrant, 2 — signs are present in two nail quadrants, 3 — signs are present in three nail quadrants, 4 — signs are present in four nail quadrants.	
Nail of great toe	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of second toe	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of third toe	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of fourth toe	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of little toe	☐ 1 ☐ 2 ☐ 3 ☐ 4
Left feet: affected nail matrix (pitting, leukonychia, red spots in the lunula, crumbling) O — no signs, 1 — signs are present in one nail quadrant, 2 — signs are present in two nail quadrants, 3— signs are present in 3 quadrants,4- signs present in 4 quadrants	
Nail of great toe	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of second toe	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of third toe	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of fourth toe	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of little toe	☐ 1 ☐ 2 ☐ 3 ☐ 4
Left feet: affected nail bed (onycholysis, subungual hyperkeratosis, hemorrhages, Oil drops/ "salmon—spot sign 0 — no signs, 1 — signs are present in one nail quadrant, 2 — signs are present in two nail quadrants,3 — signs are present in 3 nail quadrants ,4- signs present in 4 quadrants	
Nail of great toe	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of second toe	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of third toe	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of fourth toe	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of little toe	☐ 1 ☐ 2 ☐ 3 ☐ 4
NAPSI result	

NAIL PSORIASIS SEVERITY INDEX (NAPSI) OF FINGER NAIL ON ONCHYCOSCOPY

Right Hand : affected nail matrix (pitting, leukonychia, red spots in the lunula, crumbling) O — no signs, 1 — signs are present in one nail quadrant, 2 — signs are present in two nail quadrants, 3 — signs are present in 3 quadrants , 4- signs are present in 4 quadrants .	
Nail of little finger	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of ring finger	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of middle finger	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of index finger	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of thumb	☐ 1 ☐ 2 ☐ 3 ☐ 4
Right hand : affected nail bed (onycholysis, subungual hyperkeratosis, hemorrhages, "oil drops "/ "salmon-spot sign ") 0 — no signs, 1 — signs are present in one nail quadrant, 2 — signs are present in two nail quadrants, 3 — signs are present in three nail quadrants, 4 — signs are present in four nail quadrants.	
Nail of little finger	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of ring finger	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of middle finger	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of index finger	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of thumb	☐ 1 ☐ 2 ☐ 3 ☐ 4
Left hand : affected nail matrix (pitting, leukonychia, red spots in the lunula, crumbling) O — no signs, 1 — signs are present in one nail quadrant, 2 — signs are present in two nail quadrants, 3— signs are present in 3 quadrants,4- signs present in 4 quadrants	
Nail of little finger	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of ring finger	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of middle finger	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of index finger	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of thumb	☐ 1 ☐ 2 ☐ 3 ☐ 4
Left hand : affected nail bed (onycholysis, subungual hyperkeratosis, hemorrhages, Oil drops/ "salmon—spot sign 0 — no signs, 1 — signs are present in one nail quadrant, 2 — signs are present in two nail quadrants,3 — signs are present in 3 nail quadrants ,4- signs present in 4 quadrants	
Nail of little finger	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of ring finger	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of middle finger	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of index finger	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of thumb	☐ 1 ☐ 2 ☐ 3 ☐ 4
NAPSI result	

NAIL PSORIASIS SEVERITY INDEX (NAPSI) OF TOE NAILS ON ONCHYCOSCOPY

Right feet : affected nail matrix (pitting, leukonychia, red spots in the lunula, crumbling) O — no signs, 1 — signs are present in one nail quadrant, 2 — signs are resent in two nail quadrants, 3 — signs are present in 3 quadrants ,4- signs present in 4 quadrants .	
Nail of little toe	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of second toe	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of third toe	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of fourth toe	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail big toe	☐ 1 ☐ 2 ☐ 3 ☐ 4
Right feet : affected nail bed (onycholysis, subungual hyperkeratosis, hemorrhages, "oil drops "/ "salmon-spot sign ") 0 — no signs, I — signs are present in one nail quadrant, 2 — signs are present in two nail quadrants, 3 — signs are present in three nail quadrants, 4 — signs are present in four nail quadrants.	
Nail of little toe	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of second toe	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of third toe	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of fourth toe	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of big toe	☐ 1 ☐ 2 ☐ 3 ☐ 4
Left feet: affected nail matrix (pitting, leukonychia, red spots in the lunula, crumbling) O — no signs, 1 — signs are present in one nail quadrant, 2 — signs are present in two nail quadrants, 3— signs are present in 3 quadrants,4- signs present in 4 quadrants	
Nail of little toe	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of second toe	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of third toe	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of fourth toe	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of big toe	☐ 1 ☐ 2 ☐ 3 ☐ 4
Left feet: affected nail bed (onycholysis, subungual hyperkeratosis, hemorrhages, Oil drops/ "salmon—spot sign 0 — no signs, 1 — signs are present in one nail quadrant, 2 — signs are present in two nail quadrants,3 — signs are present in 3 nail quadrants ,4- signs present in 4 quadrants	
Nail of little toe	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of second toe	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of third toe	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of fourth toe	☐ 1 ☐ 2 ☐ 3 ☐ 4
Nail of big toe	☐ 1 ☐ 2 ☐ 3 ☐ 4
NAPSI result	

ANNEXURE IV – PHOTOGRAPHS

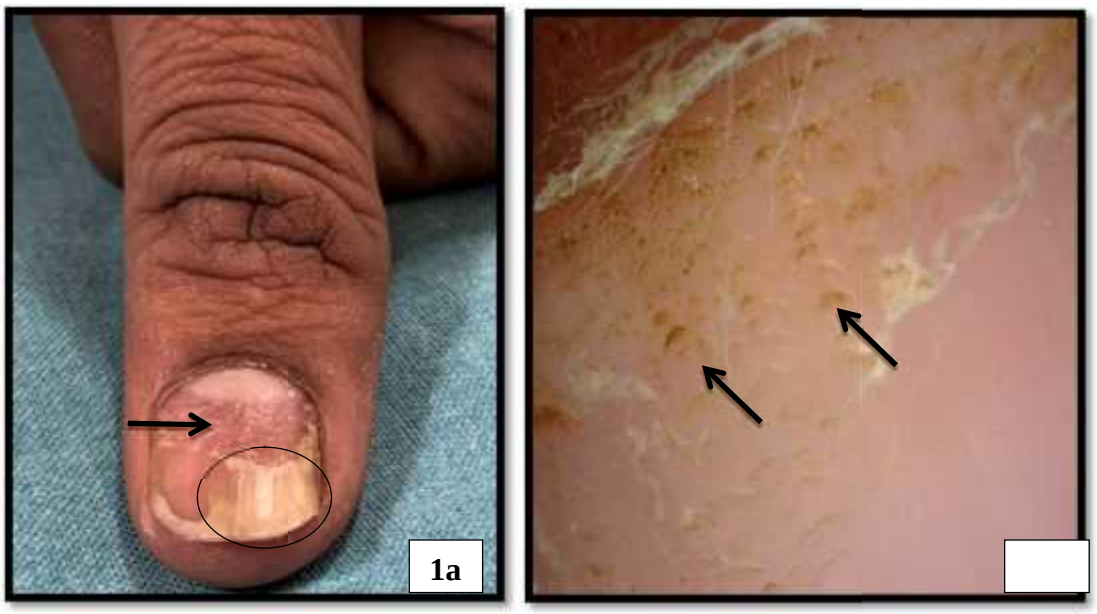


FIGURE 1a –CLINICAL PICTURE SHOWING MULTIPLE PITS (ARROW) AND DISTAL ONYCHOLYSIS (CIRCLE).

FIGURE 1 b – DERMOSCOPY PICTURE (50 x) HIGHLIGHTING MULTIPLE PITS (ARROWS).

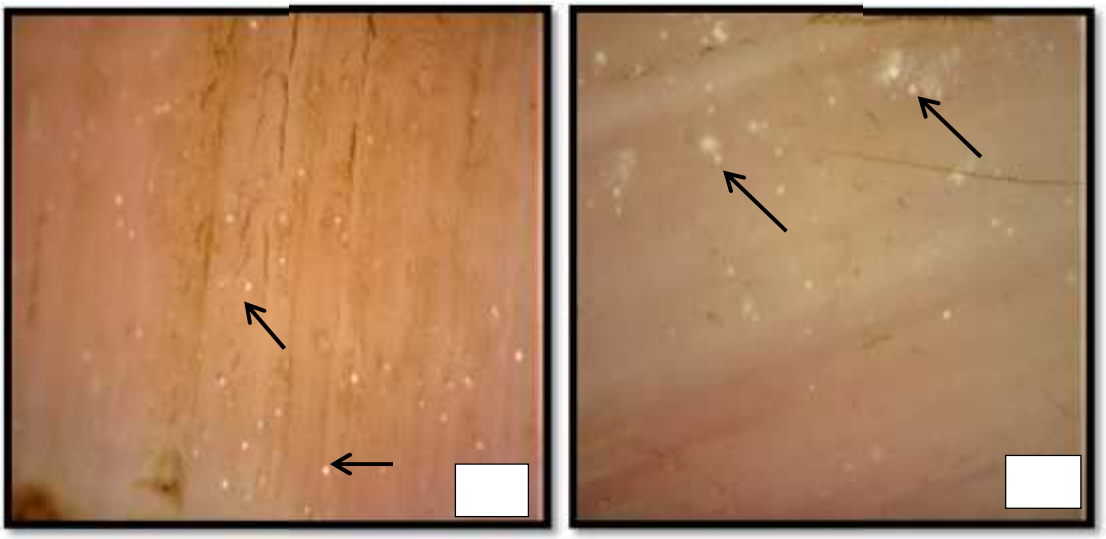


FIGURE 2a –CLINICAL PICTURE SHOWING MULTIPLE PUNCTATE LEUKONYCHIA (ARROW)

FIGURE 2 b – DERMOSCOPY PICTURE (50 x)SHOWING MULTIPLE PUNCTATE LEUKONYCHIA (ARROW).

FIGURE 3a – CLINICAL PICTURE SHOWING DIFFUSE LEUCONYCHIA(ARROW).

FIGURE 3b –DERMOSCOPY PICTURE (50x) SHOWING DIFFUSE LEUCONYCHIA (ARROWS).

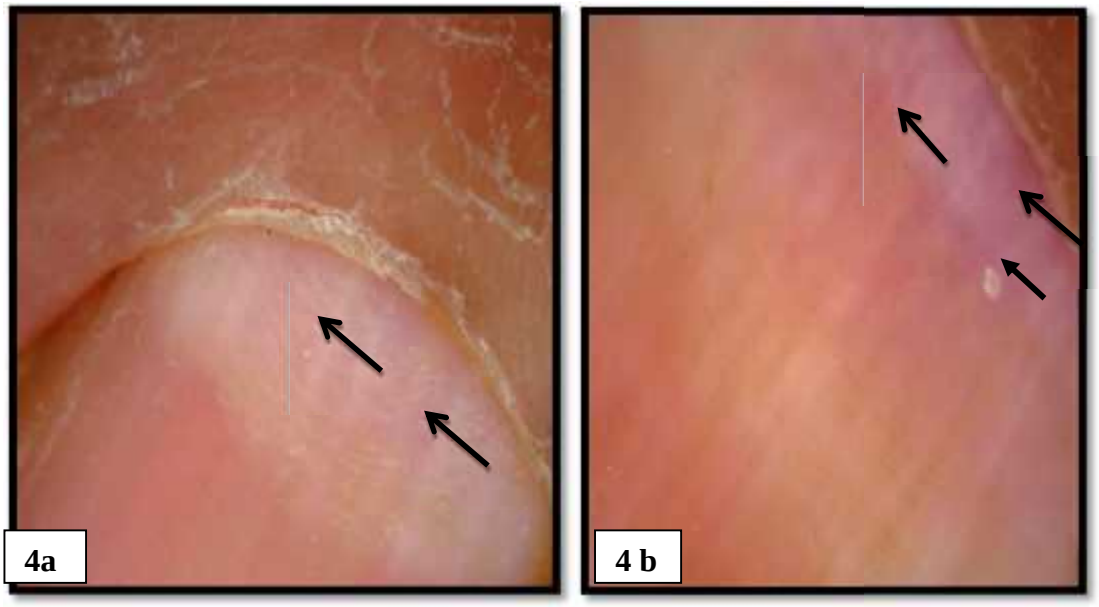


FIGURE 4a – CLINICAL PICTURE SHOWING RED SPOTS IN LUNULA (ARROWS).

FIGURE 4b –DERMOSCOPY PICTURE (50x) SHOWING RED SPOTS IN LUNULA (ARROWS).

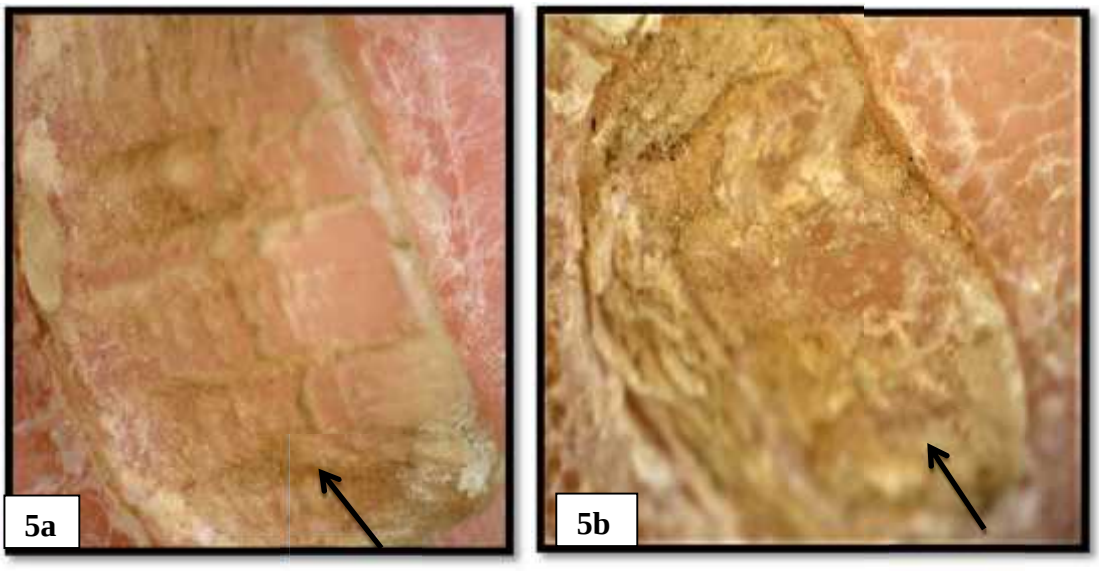


FIGURE 5a – CLINICAL PICTURE SHOWING CRUMBLING OF NAIL (ARROW).

FIGURE 5b –DERMOSCOPY PICTURE (50x) SHOWING CRUMBLING OF NAIL (ARROW).

FIGURE 6 – CLINICAL PICTURE SHOWING CRUMBLING OF NAIL.

FIGURE 7 – CLINICAL PICTURE SHOWING SUBUNGUAL HYPERKERATOSIS (ARROWS).

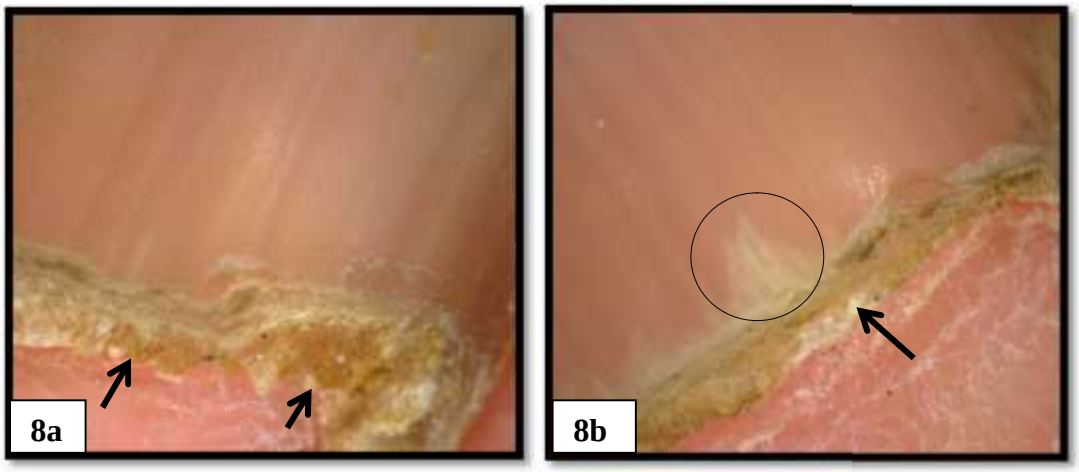


FIGURE 8 a –DERMOSCOPY PICTURE (50x)SHOWING SUBUNGUAL HYPERKERATOSIS (ARROWS).

FIGURE 8b-DERMOSCOPY PICTURE (50x) SHOWING SUBUNGUAL HYPERKERATOSIS (ARROW) AND ONYCHOLYSIS (CIRCLE).

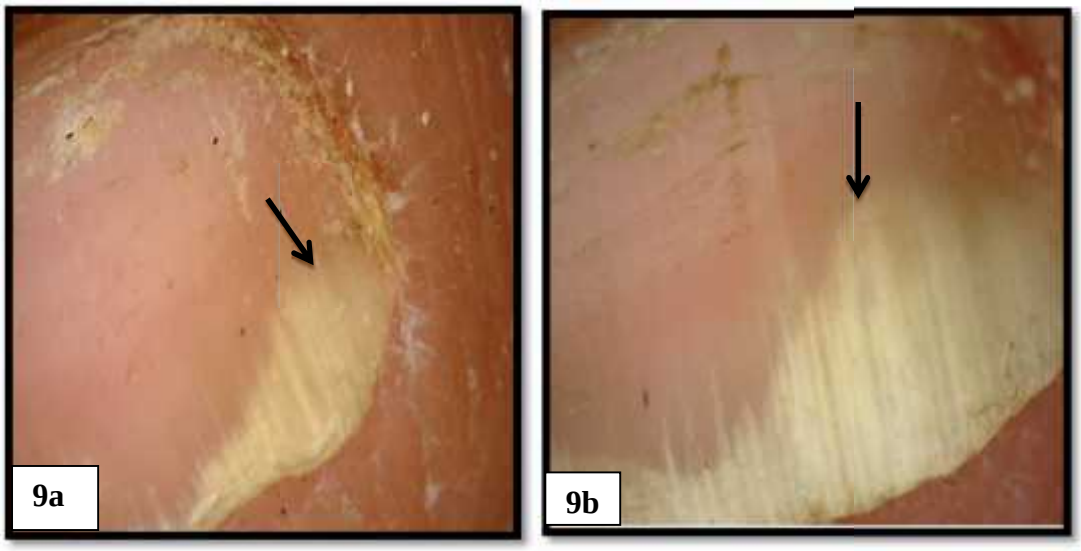


FIGURE 9a –CLINICAL PICTURE SHOWING DISTAL ONYCHOLYSIS (ARROW).

FIGURE 9b-DERMOSCOPY PICTURE (50x) SHOWING DISTAL ONYCHOLYSIS (ARROW).

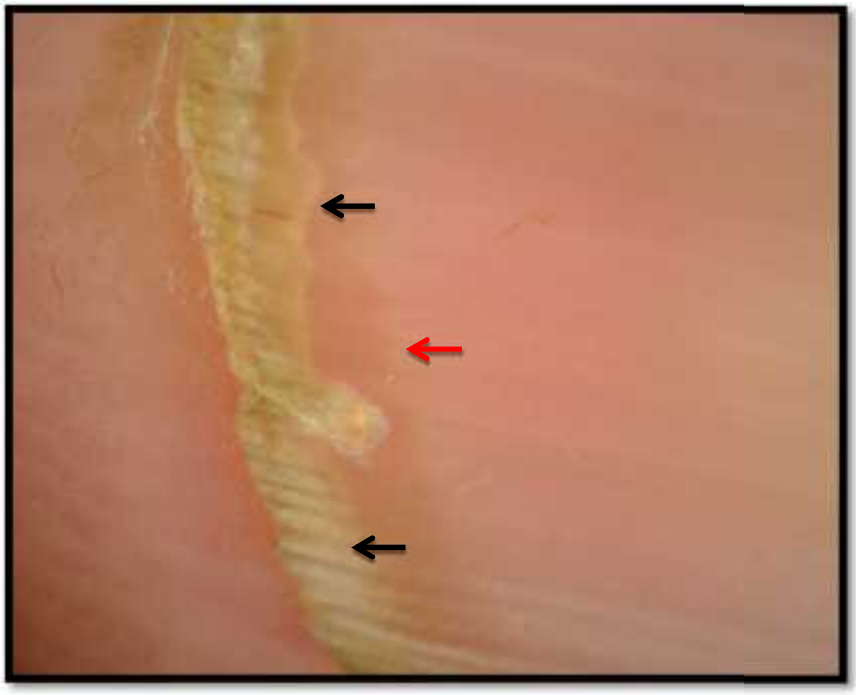


FIGURE 10 –DERMOSCOPY PICTURE (50x) SHOWING ONYCHOLYSIS (BLACK ARROW) WITH LINE OF ERYTHEMA BELOW (RED ARROW).

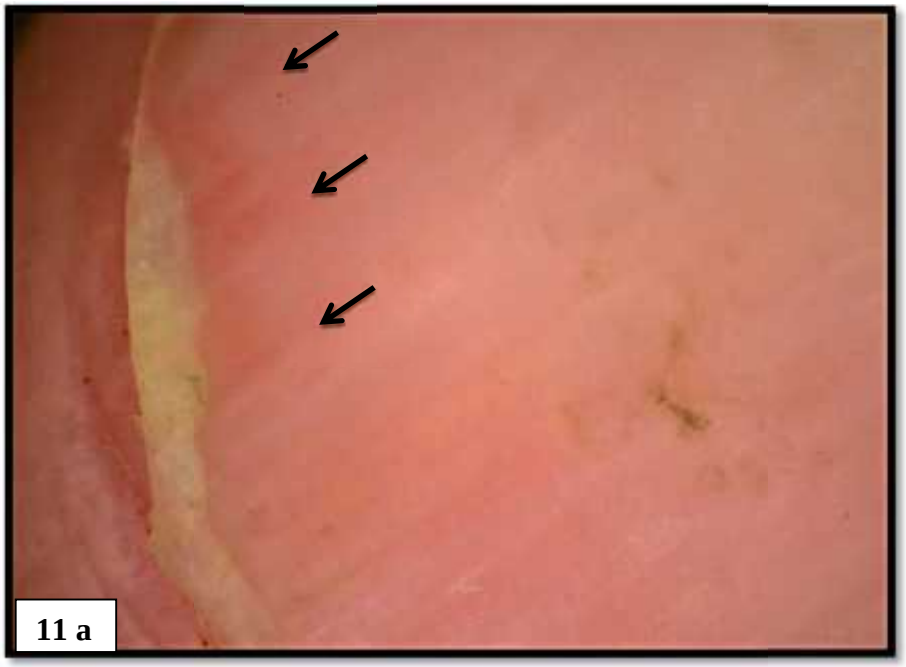


FIGURE 11 a –CLINICAL PICTURE SHOWING SPLINTER HEMORRHAGES (ARROW) .

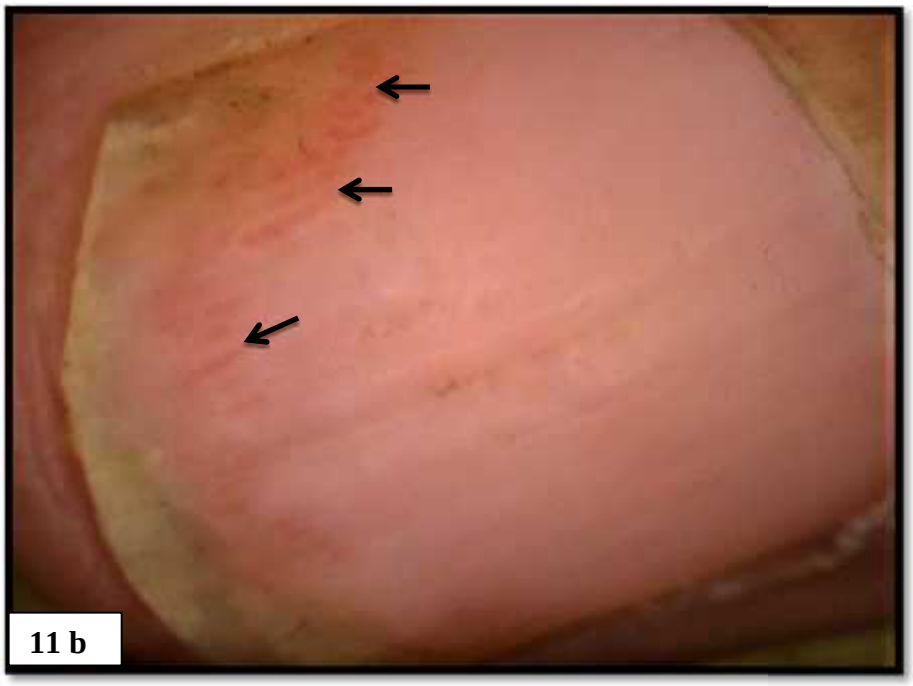


FIGURE 11 b –DERMOSCOPY PICTURE (50x) SHOWING SPLINTER HEMORRHAGES (ARROW) .

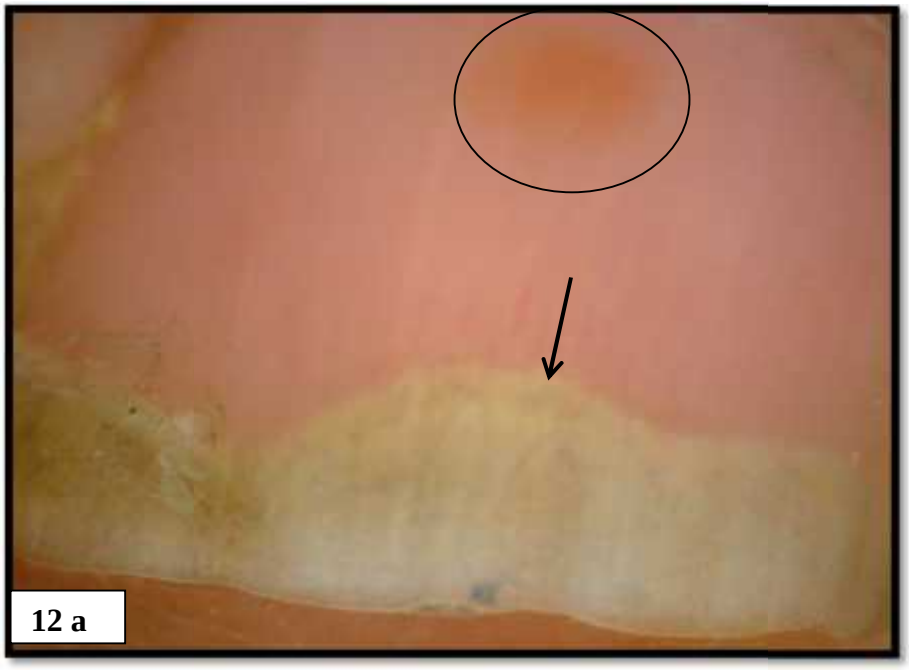


FIGURE 12a – CLINICAL PICTURE SHOWING ONYCHOLYSIS (ARROW) AND OIL DROP SIGN (CIRCLE)

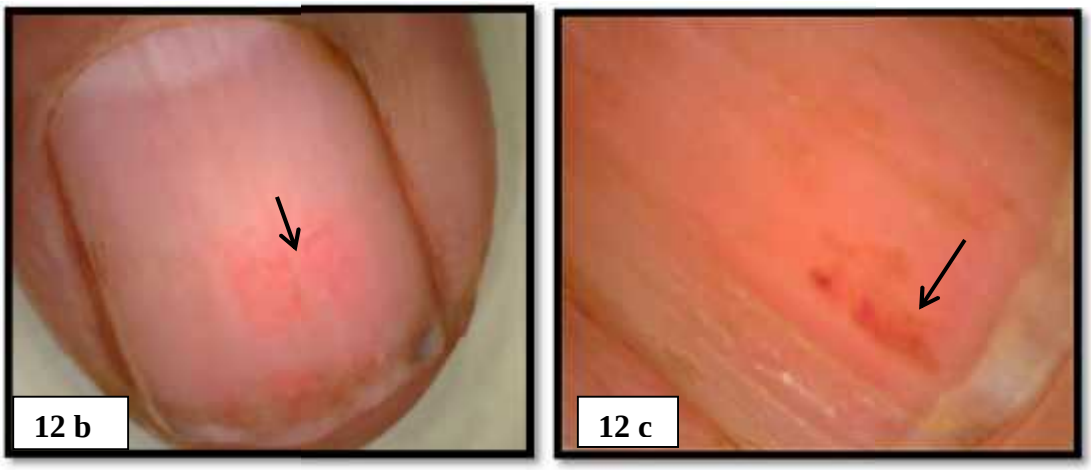


FIGURE 12 (b and c) –DERMOSCOPY PICTURE (50 x) SHOWING OIL DROP SIGN (ARROWS).

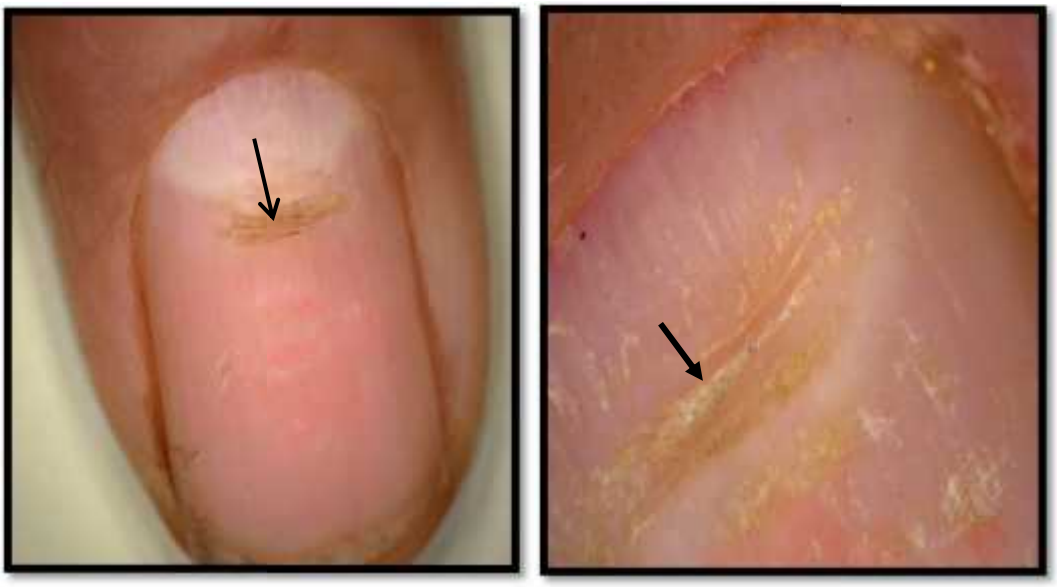


FIGURE 13 a –CLINICAL PICTURE SHOWING BEAU'S LINE (ARROW) .

FIGURE 13 b –DERMOSCOPY PICTURE (50x) SHOWING BEAU'S LINE (ARROW).

FIGURE 14 – CLINICAL PICTURE SHOWING LONGITUDINAL MELANONYCHIA (BRACKET).

FIGURE 15- CLINICAL PICTURE OF PTERYGIUM OF NAIL (ARROW).

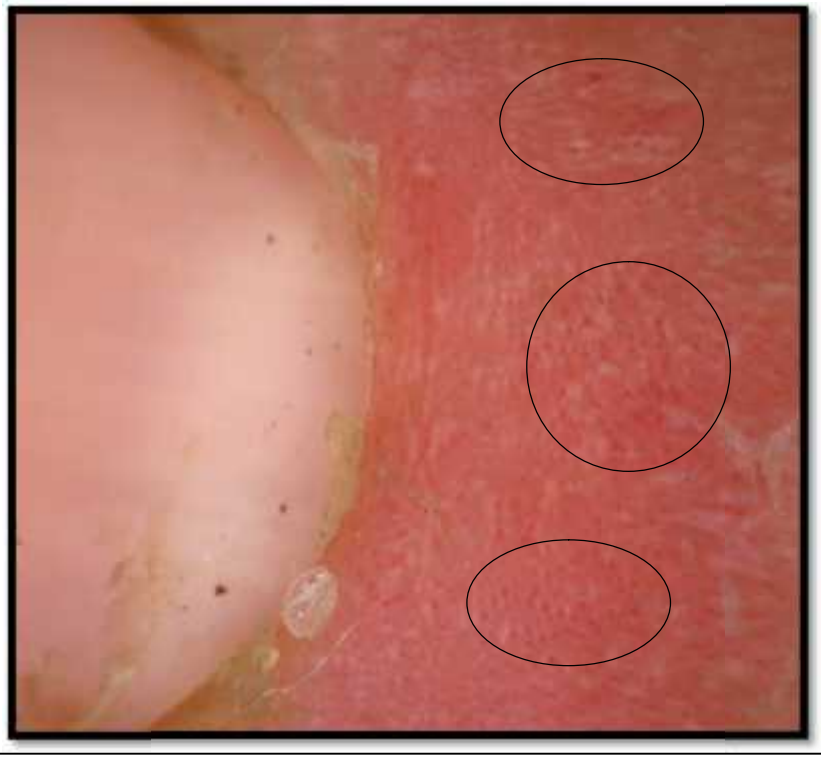


FIGURE 16 - DERMOSCOPY PICTURE (50X) SHOWING DILATED HYPONYCHIAL CAPILLARIES SEEN AS RED DOTS (CIRCLE).

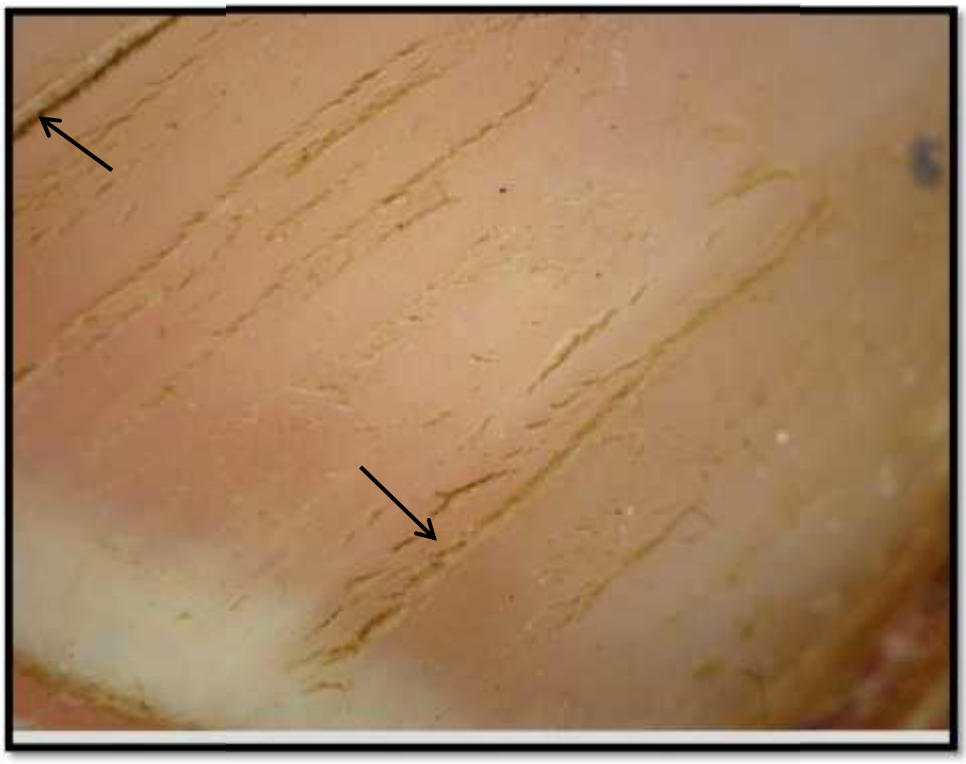


FIGURE 17 - DERMOSCOPY PICTURE (50x)SHOWING MULTIPLE LINEAR RIDGES (ARROWS).

ANNEXURE-V

KEY TO MASTER CHART

SEX –

M	-	Male
F	-	Female

TYPES OF PSORIASIS –

CPP	-	Chronic Plaque Psoriasis
E	-	Erythroderma
PP	-	Pustular psoriasis
G	-	Guttate type of psoriasis
PPK	-	Palmoplantarkeratoderma

JOINT INVOLVED -

DIP	-	Distal interphalangal joint
PIP	-	Proximal interphalangeal joint
MCP	-	Metacarpophalangeal joint

NAIL CHANGES -

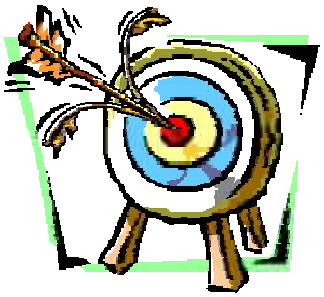
P	-	Pitting
L	-	Leukonychia
R	-	Red spots in lunula
C	-	Crumbling
ON	-	Onycholysis
SH	-	Subungual hyperkeratosis
OD	-	Oil drop sign
H	-	Haemorrhages
BL	-	Beau’s line

YD	-	Yellowish discolouration
LR	-	Linear ridges
LM	-	Longitudinal melanonychia.
AB.C	-	Absent cuticle
WD	-	Whitish discolouration
DC	-	Dilated capillaries

SCORES –

PASI score	-	Psoriasis area and severity index
NAPSI score	-	Nail psoriasis severity index

Introduction



Objectives

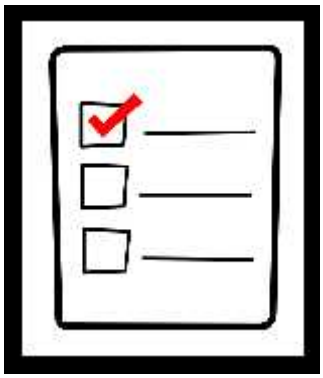
Review of Literature

Methodology

Results

Discussion

Conclusion



Limitations

Recommendations

Summary

Bibliography

Annexure-I

Annexure-II

Annexure-III

Annexure-IV

Annexure-V