A Cross-Sectional Observational Study of Clinical, Histopathological, and Dermoscopic Correlation in Patients with Nail Psoriasis at a Tertiary Care Hospital

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Abstract

Background: Among various nail disorders encountered in dermatology outpatient department, nail psoriasis is not uncommon. Around 80%–90% of patients with psoriasis present with nail involvement at some point in their life. In 1%–5% of patients, alterations compatible with nail psoriasis may also occur in the absence of cutaneous lesions. There is limited literature on nail psoriasis especially in Indian patients. **Objective:** The present study was undertaken to evaluate clinical, histopathological, and dermoscopic features in nail psoriasis and its impact on quality of life. **Materials and Methods:** All clinically suspected cases of nail psoriasis were included in the study. Clinical parameters and dermoscopic findings were observed and noted. Nail biopsy was performed to confirm the findings. Impact on quality of life was evaluated by correlating Nail Psoriasis Severity Index (NAPSI) score and nail psoriasis quality of life scale (NPQ10) score. **Results:** Of 50 patients with clinically suspected nail psoriasis, skin involvement was seen in 45 (90%), and 5 (10%) had only nail involvement. The mean NAPSI score was 34.34 in our study. The most common clinical nail finding was pitting (38 [76%]) followed by onycholysis (31 [62%]). The most common dermoscopic finding was pitting (39 [76%]) followed by onycholysis (32 [64%]). Histopathologically, the most common finding was parakeratosis (41 [82%]) followed by focal hypergranulosis (40 [80%]). The majority of the patients (21 [42%]) had NPQ10 (modified) score between 10 and 20, and moderate positive correlation between NAPSI score and NPQ10 scale score was observed. **Limitations:** Small sample size and no control group. **Conclusion:** Nail psoriasis does impact the quality of life of patients especially in females who feel embarrassed in social gatherings and workplace. Nail biopsy, though painful and difficult to perform, is the most efficient method to diagnose nail psoriasis.

Keywords: Histopathology, nail psoriasis, onychoscopy, quality of life

Introduction

Psoriasis is a chronic inflammatory and proliferative condition of the skin, in which both genetic and environmental factors have been implicated. It is variable in duration, periodicity of flares, and extent, with a worldwide prevalence of approximately 1%–3%.[1] Around 80%–90% of patients with psoriasis present with nail involvement at some point in their life. The prevalence of nail involvement in psoriasis patients is approximately 50%.[2,3] Among patients with psoriatic arthritis, the prevalence of nail involvement could be as high as 80.5%.[4]

In 1%–5% of patients, alterations compatible with nail psoriasis may also occur in the absence of cutaneous lesions.[5] These alterations are not exclusive to psoriasis and could mimic other nail disorders such as onychomycosis, lichen planus, and eczema. Thus, determining the exact cause poses a problem in patients with isolated nail involvement. Occurrence of two different conditions in the same patient further complicates the diagnosis. This is true for nail psoriasis and onychomycosis, which are known to coexist with similar histopathological features.

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Onychoscopy may help distinguish these and is important for choosing the correct biopsy site. The prior studies on nail psoriasis histopathology are very few and performed only on small sample sizes.[6-9] This could be partly due to reluctance to perform nail unit biopsies on the part of dermatologists due to the difficulty of the procedure and required expertise for interpretation.

Hence, we carried out a comprehensive study of the clinical, dermoscopic, and histopathological features of nail psoriasis, with an aim to observe the various patterns and evaluate the diagnostic significance of each of the above three modalities. To the best of our knowledge, no study has been done that evaluated clinical, dermoscopic, and histopathological profiles together in nail psoriasis. We also evaluated the impact of nail psoriasis on the quality of life (QOL).

Materials and Methods

It was a cross-sectional observational study done over a period of 18 months after taking approval from the Institutional Ethics Committee. In the study, 50 patients with clinical suspicion of nail psoriasis with or without cutaneous features attending Dermatology Out Patient Department (OPD) in our tertiary care hospital were recruited using convenient sampling techniques after taking an informed written consent. A detailed history was taken, and clinical findings of nail changes were recorded. Nail Psoriasis Severity Index (NAPSI) score and Nail Psoriasis Quality of Life scale (NPQ10) score were calculated.

Grading psoriatic nails using NAPSI

The nail is divided with imaginary horizontal and longitudinal lines into quadrants.[10] Each nail is given a score for nail bed psoriasis (0–4) and nail matrix psoriasis (0–4) depending on the presence of any of the features of nail psoriasis in that quadrant.

1. Evaluation 1: Nail matrix. In each quadrant of the nail, nail matrix psoriasis is evaluated by presence of any of the nail matrix features (pitting, leukonychia red spots in the lunula, and crumbling): 0 for none, 1 if present in one quadrant of the nail, 2 if present in two quadrants of the nail, 3 if present in three quadrants of the nail, and 4 if present in four quadrants of the nail.
2. Evaluation 2: Nail bed. Nail bed psoriasis is evaluated by the presence of any of the nail bed features [(onycholysis, splinter hemorrhages, subungual hyperkeratosis, "oil drop" (salmon patch dyschroma)]: 0 for none, 1 for one quadrant only, 2 for two quadrants, 3 for three quadrants, and 4 for four quadrants.
3. Each nail gets a matrix score and a nail bed score, the total of which is the score for that nail (0–8).
4. Each nail is evaluated, and the sum of all the nails is the total NAPSI score. The sum of the scores from all nails is 0–80; or 0–160 if toenails are included. At any time, the matrix or nail bed score can be assessed independently if desired.

NPQ10 scale devised by Ortonne *et al*.[11] was modified to suit Indian population as questions such as driving car is irrelevant most of times for Indian population. Dermoscopic and histopathological features of all the patients were observed and recorded. Dino-Lite Edge AM7515MZT Metal handheld digital microscope, made in Taiwan by ANMO electronic corporation with 15×–240× resolution, was used for dermoscopy.

At present, there are no available clinical and dermoscopic examination-based diagnostic criteria for nail psoriasis to support clinical or dermoscopic diagnosis and standardization of disease definition in research studies; so for the purpose of uniformity, we devised the following clinical and dermoscopic criteria.

Clinical criteria

1. Onycholysis surrounded by erythematous/tinted border
2. Oil spots
3. Deep and irregular pits
4. Periungual psoriatic scaling

The presence of two or more features was considered diagnostic as these findings are characteristically seen in nail psoriasis.

Dermoscopic criteria

1. Onycholysis surrounded by erythematous/tinted border
2. Oil spots
3. Deep and irregular pits
4. Irregular dilated tortuous capillaries at the onycholytic nail margin

The presence of two or more features was considered diagnostic as these findings are characteristically seen in nail psoriasis.

Nail biopsy was mainly done from nail bed, matrix biopsy was performed in selected cases such as patients with nail pitting, crumbling, red spots in lunula, and leukonychia.

Histopathological diagnosis was confirmed by applying the diagnostic criteria proposed by Hanno *et al*.[6]

Major: Neutrophils in epidermis.

Minor: (1) Hyperkeratosis with parakeratosis, (2) serum exudates, (3) focal hypergranulosis, and (4) epidermal hyperplasia.

Patients who did not satisfy any of the three criteria were classified as nondiseased for the purpose of the study.

All the biopsy specimens were subjected to Periodic acid-Schiff (PAS) stain to rule out onychomycosis.

Exclusion criteria

1. Patients on systemic immunosuppressants for psoriasis in the last 3 months.
2. Patients of skin psoriasis without nail changes.
3. Patients with nail dystrophy without psoriatic nail changes.

Graph Pad Instat 3.0 (GraphPad Software, San Diego, California, USA) was used for all statistical analysis. Descriptive analysis in terms of mean and standard deviation for continuous variables and frequency with percentage for nominal and ordinal variables were used. Association between sociodemographic profile and QOL with characteristics of nail psoriasis was done using Chi-square test. Correlation of NPQ10 scale scores with NAPSI score was done using Pearson's coefficient of correlation. The sensitivity and specificity of clinical examination, dermoscopy, and histopathology in the diagnosis of nail psoriasis were calculated to know the power of the diagnostic tests and were compared with each other.

Results

The mean age of the study sample was 42.04 years with maximum number of patients in 51–65 years of age group. Males outnumbered females in our study with an M:F ratio of 3.17:1. The mean age of female patients (37.33) was lower than that of males (43.63). The mean duration of nail disease ranged from 1 to 216 months with the mean duration of the disease being 38.96 months.

Fingernail involvement (100%) was more common than that of toenails 34 (68%) with 11 patients (22%) having symmetrical involvement of nails.

Of 50 patients, skin was involved in 45 patients (90%), and five patients (10%) had no skin lesions. Nearly half of the 45 patients with skin involvement viz. 21 (46.67%) had skin involvement for less than 2 years. The duration of cutaneous disease ranged from 1 to 216 months.

Of 50 patients, 32 (64%) had scalp involvement, 18 (36%) had joint involvement, whereas only two patients (4%) had mucosal involvement. Joint involvement was present for less than 2 years in 13 (72.22%) of 18 patients who had joint involvement. The duration of joint involvement ranged from 2.5 to 120 months. Most common joints involved were small joints of hand and feet (13 [72.22%]) followed by knee joint (8 [44.44%]) with 14 patients (77.77%) having symmetrical joint involvement.

Six patients (12%) had hypertension, four (12%) had diabetes, and one (2%) had thyroid disease. Three patients (6%) had positive family history of psoriasis.

Chronic plaque psoriasis was the most common type of psoriasis (32 patients), followed by palmoplantar psoriasis (eight patients), scalp psoriasis (three patients), and one patient each of pustular, erythrodermic, and arthropathic psoriasis.

The most common clinical nail finding [Figure 1] was coarse irregular pitting (38 [76%]) [Figure 2] followed by onycholysis (31 [62%]), crumbling (27 [54%]), salmon patch (22 [44%]), subungual hyperkeratosis (20 [40%]), periungual scaling (11 [22%]), longitudinal/transverse ridges (6 [12%]), red spots on lunula (3 [6%]), splinter hemorrhages (3 [6%]), and leukonychia (2 [4%]) in decreasing order of frequency.

The most common dermoscopic finding [Figure 3] was coarse pitting (39 [76%]) followed by onycholysis (32 [64%]) and irregular dilated tortuous capillaries (32 [64%]) [Figure 4], salmon patch (25 [50%]), crumbling (24 [48%]), splinter hemorrhages (20 [40%]), transverse or longitudinal ridges (14 [28%]), and subungual pustules (1 [2%]) in decreasing order of frequency.

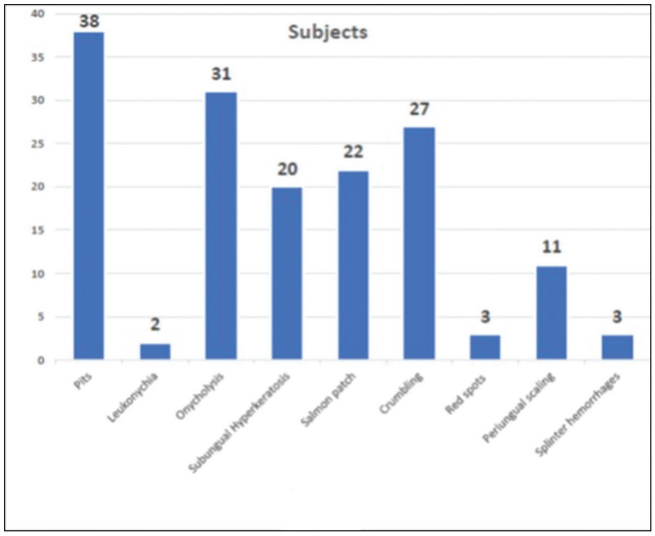

Figure 1: Bar graph demonstrating clinical findings observed in the study

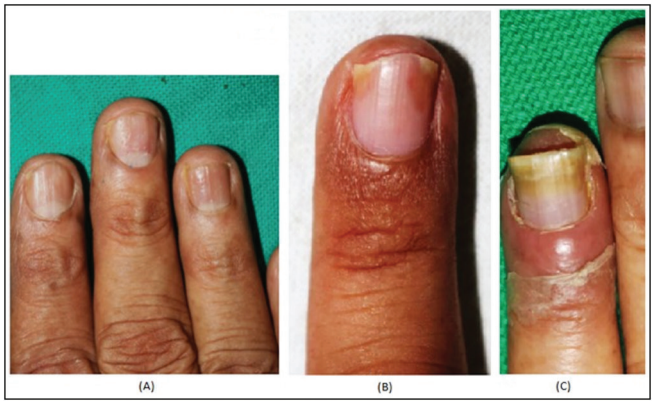

Figure 2: (A) Coarse irregular pits, (B) Salmon patch, (C) distal onycholysis surrounded by erythematous border

Histopathologically, the most common finding [Figure 5] was parakeratosis (41 [82%]) followed by hypergranulosis (40 [80%]), psoriasiform epidermal hyperplasia (33 [66%]), neutrophils in epidermis (32 [64%]), dilated blood vessels in papillary dermis (30 [60%]) [Figure 6], orthohyperkeratosis (16 [32%]), spongiosis (5 [10%]), serum exudates (4 [8%]), papillomatosis (2 [4%]), and acanthosis (1 [2%]).

One patient among the nondiseased cases was diagnosed as lichen planus on the basis of histopathology [Figure 7].

PAS stain showed yeast cells in four cases and hyphae in orthohyperkeratotic and parakeratotic epithelium in one case. Hence, we diagnosed that one case with fungal invasion as true onychomycosis.

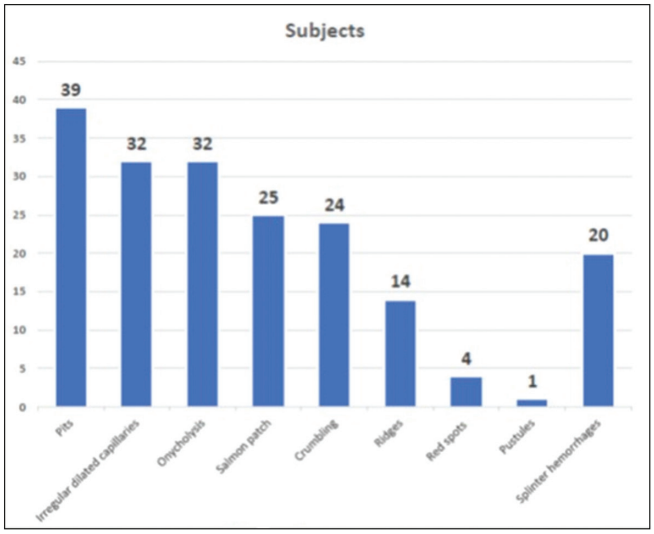

Figure 3: Bar graph demonstrating dermoscopic findings observed in the study

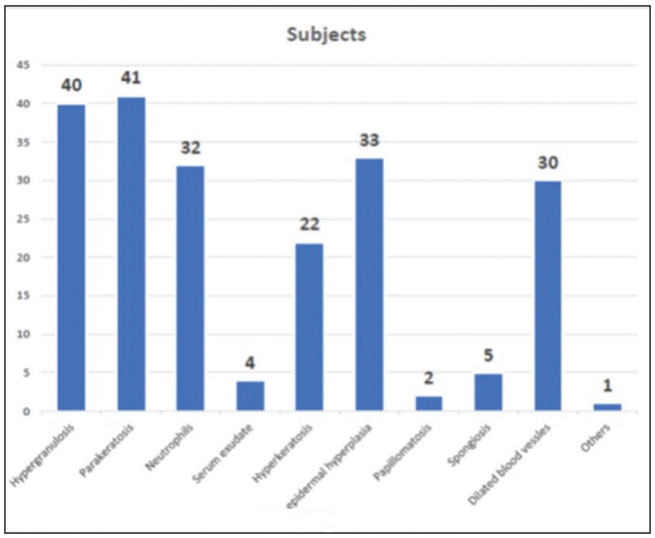

Figure 5: Bar graph demonstrating histopathological findings observed in the study

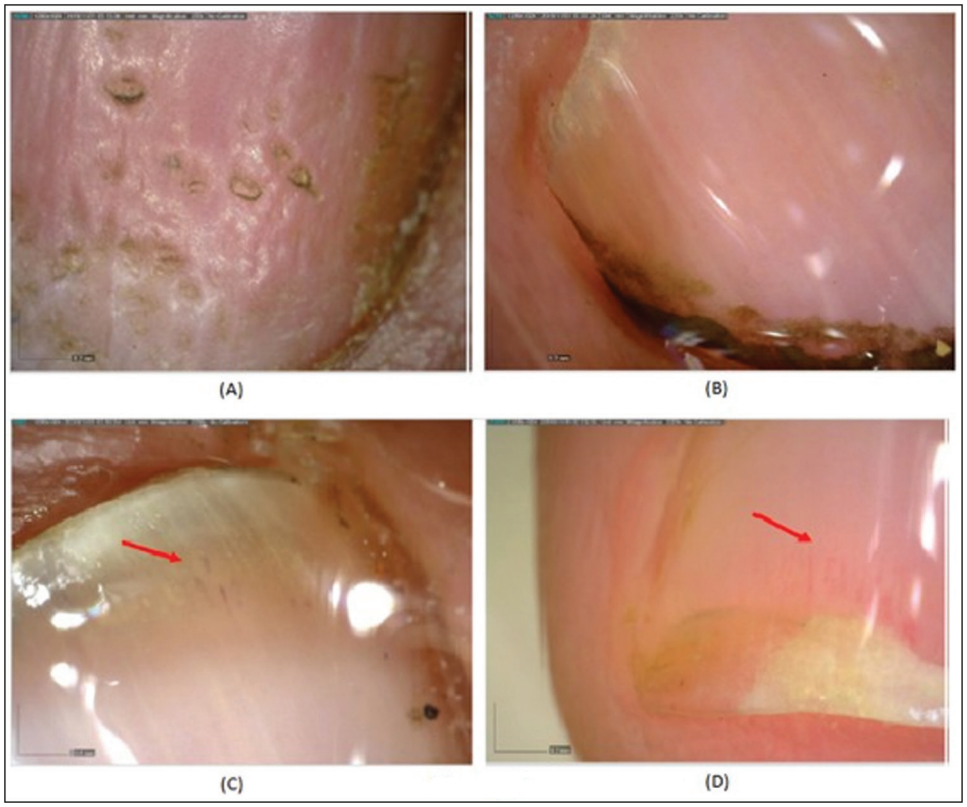

Figure 4: Dermoscopy using Dino-Lite (50× magnification) (A) Coarse irregular pits, (B) Salmon patch, (C) splinter hemorrhages, (D) dilated tortuous capillaries

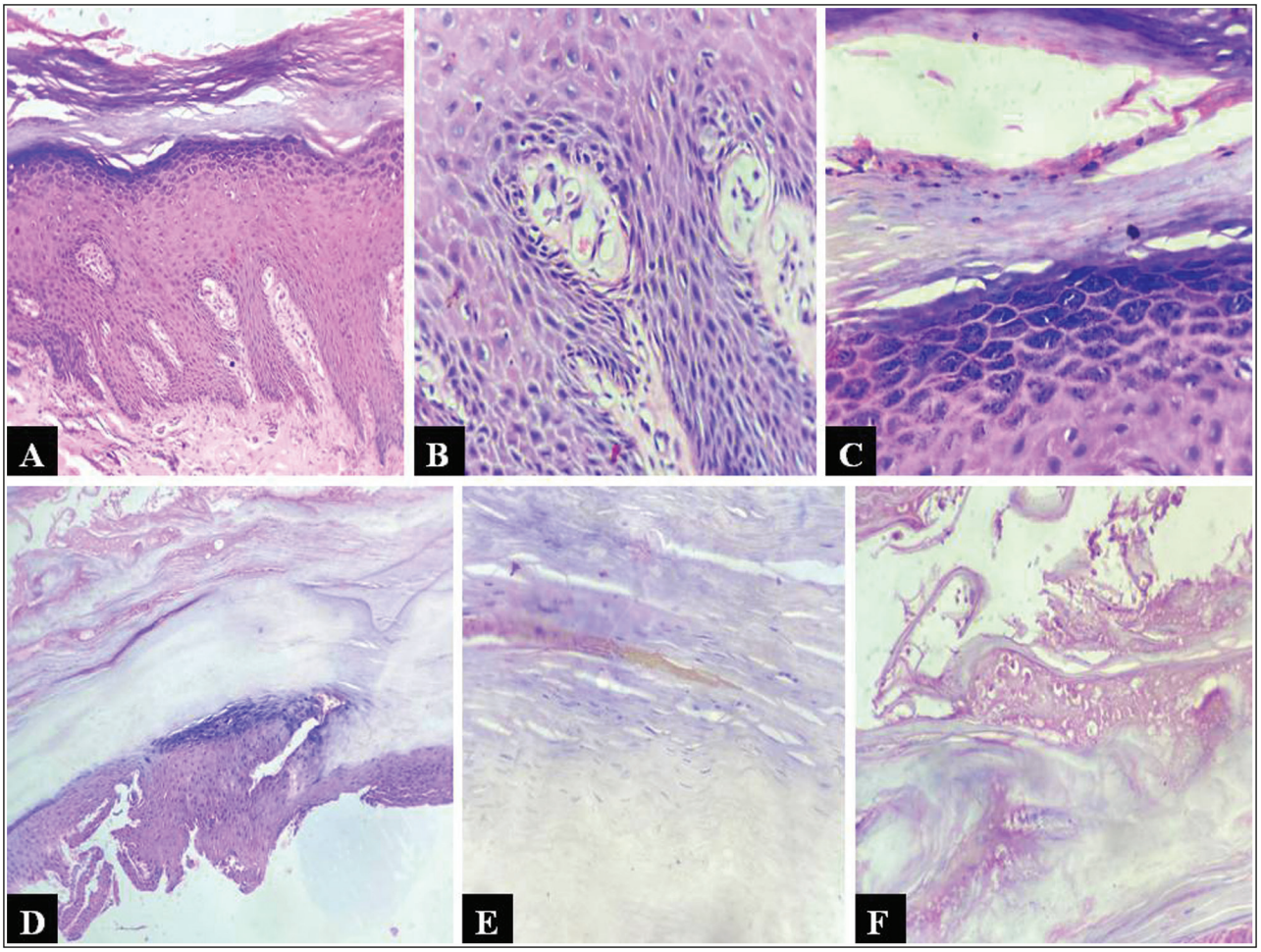

Figure 6: Histopathology (H&E): From nail bed (A) psoriasiform epidermal hyperplasia, orthohyperkeratosis with parakeratosis and focal hypergranulosis (10×), (B) dilated capillaries in papillary dermis (40×), (C) neutrophils in parakeratotic stratum corneum with hypergranulosis (40×); From nail plate and matrix (D) focal hypergranulosis with hyperkeratosis (10×), (E) parakeratosis (40×), (F) serum exudate (40×)

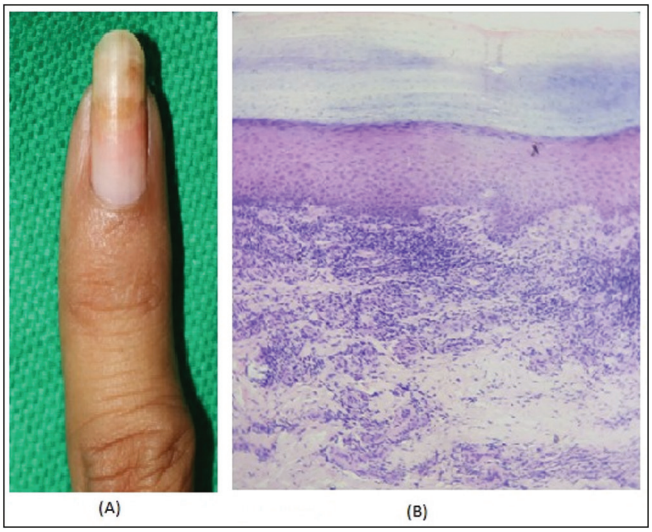

Figure 7: (A) Patient with onycholysis surrounded by erythematous border clinically; (B) H&E (40×): diffuse hypergranulosis, lichenoid infiltrate, and focal basal layer vacuolization

The majority of the patients, viz. 21 (42%), had NPQ10 (modified) score between 10 and 20. There is a significant association between gender and QOL. Females had a poor QOL compared with males in the study, which was statistically significant. No statistically significant association was established of QOL with other variables such as duration of nail disease, number of nails involved, duration of skin disease, joint involvement, or scalp involvement. The majority of the patients, viz. 34 (68%), had NAPSI score between 0 and 40 with the mean NAPSI score being 34.34 in our study. Pearson coefficient of correlation was 0.6535 signifying moderate positive correlation between NAPSI score and NPQ10 scale score [Figure 8]. Hence, the greater the nail involvement, the greater the effect on QOL.

Histopathology has the highest specificity (100%) and sensitivity (80%) in diagnosing nail psoriasis, followed by Dermoscopy with specificity and sensitivity being 80% and 77.5%, respectively, and lastly clinical examination with

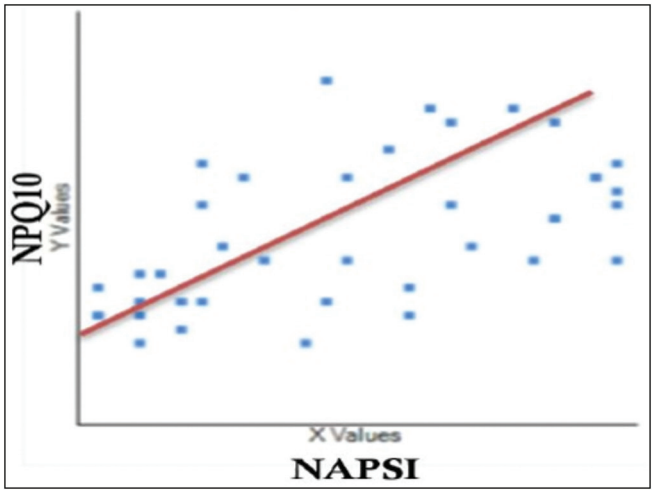

Figure 8: Scatter diagram demonstrating correlation between NAPSI score and NPQ10 scale score

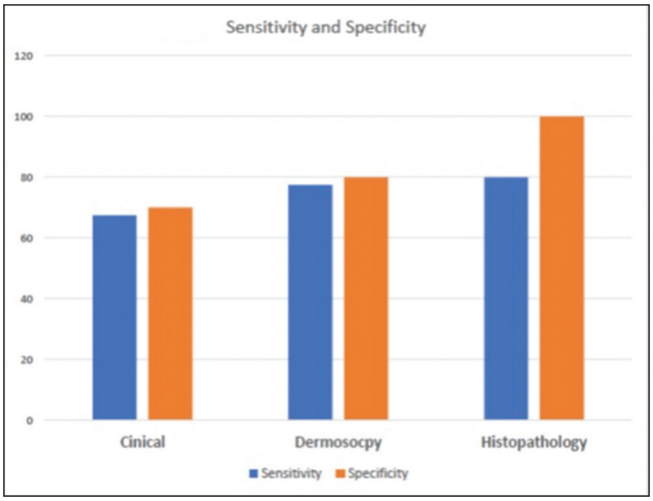

Figure 9: Bar graph demonstrating comparison of sensitivity and specificity of the three modalities—clinical, dermoscopy, and histopathology

specificity and sensitivity of 70% and 67.5%, respectively [Figure 9].

Discussion

Our study was conducted on 50 clinically suspected nail psoriasis patients with or without cutaneous features of psoriasis attending the Dermatology Outpatient department of a tertiary care hospital of a metropolitan city. The mean age of the study sample was 42.04 years with a range of age of the sample between 18 and 65 years. This was in contrast to the study by Daulatabad *et al.*,[12] wherein the mean age of the study sample was 36.3 years with the range of 15–65 years. There were 38 (76%) males and 12 (24%) females with a male-to-female ratio of 3.17:1. A higher proportion of male patients have been observed in other Indian studies as well,[13,14] whereas a study done by de Berker *et al.*[13] reported an equal sex distribution. This difference between Indian and Western studies could be due to a greater number of males seeking medical attention due to cultural or ethnic differences.

Half of the patients, viz. 25 (50%), had the disease for less than 2 years. In comparison, Daulatabad *et al.*[12] reported duration of disease ranging from 15 days to 31 years with a mean duration of 21.6 years. This difference could be due to the fact that we excluded patients who had received any treatment and, hence, were comparatively new onset disease patients.

Fingernail involvement (100%) was more common than that of toenails (68%) and parallels Zaias's[8] observation. Similar findings were observed by Kaul *et al.*[14] and de Jong *et al.*[4] in their studies. Only 11 patients (22%) had symmetrical involvement of nails, whereas 39 patients (78%) had asymmetrical involvement of nails.

Of 50 patients, skin was involved along with nails in 45 patients (90%), whereas five patients (10%) had only nail involvement. A study by Grover *et al.*[7] included only patients with nail involvement without skin lesions. The duration of cutaneous disease ranged from 1 to 216 months (18 years) with mean duration being 41.21 months, that is, 3.43 years.

Of 50 patients, 32 (64%) had scalp involvement, 18 (36%) had joint involvement, whereas only two patients (4%) had mucosal involvement. Mucosal involvement was in the form of geographic tongue in two patients. The duration of joint involvement in 18 patients ranged from 2.5 months to 10 years with involvement of small joints of hand and feet being the commonest (15 [83.33%]), followed by involvement of knee joint (13 [72.22%]), wrist joint (8 [44.44%]), ankle joint (6 [33.33%]), and lastly elbow (1 [5.55%]) and spine (1 [5.55%]). Fourteen (77.77%) had symmetrical joint involvement, whereas four patients (22.22%) had asymmetrical joint involvement. The most common pattern of psoriatic arthritis observed was symmetrical polyarthritis, which was in concordance with the study done by Kumar *et al.*[15]

Clinically, the most common nail finding was coarse irregular pitting (76%) followed by onycholysis. This was in concordance with the findings observed in the studies by Tan *et al.*,[5] Zaias,[8] and an Indian study by Kaur *et al.*[16] In contrast, several others studies report onycholysis as the most common finding.[7,14,17] Pitting was the most common nail matrix change and onycholysis was the most common nail bed change in our study, which was in line with the observations made by Daulatabad *et al.*'s[12] study. Comparison of psoriatic nail changes of various studies are depicted in Table 1.

The mean NAPSI score in our study was 34.34, which was in contrast to the study by Daulatabad *et al.*,[12] wherein it was higher (83.16).

In our study, chronic plaque psoriasis was the most commonly associated type of psoriasis (32 patients),

Table 1: Comparative table with a frequency of different psoriatic nail changes

Nail changes	Present study	Kaul *et al*.[14]	Brazzelli *et al*.[17]	Grover *et al*.[7]
	N = 50	*N* = 60	*N* = 178	*N* = 42
Onycholysis	31 (62%)	56 (93.3%)	78.8%	76%
Subungual hyperkeratosis	20 (40%)	48 (80%)	53.3%	33%
Coarse pitting	38 (76%)	44 (73.3%)	44.5%	52%
Ragged/absent cuticle	–	41 (68.3%)	–	48%
Leukonychia	2 (4%)	32 (53.3%)	11.7%	–
Brownish discoloration	–	26 (43.3%)	–	67%
Oil drop sign/Salmon patch	22 (44%)	25 (41.6%)	34.3%	14%
Longitudnal melanonychia	–	18 (30%)	–	–
Beau's lines	–	15 (25%)	–	–
Trachyonychia	6 (12%)	14 (23.3%)	–	–
Crumbling	27 (24%)	6 (10%)	54%	–
Red spot in lunula	3 (6%)	4 (6.6%)	–	–
Periungual scaling	11 (22%)	–	–	–

Table 2: Comparative table of different dermoscopic features in nail psoriasis

Dermoscopic features	Present study	Polat *et al*.[19]	Yorulmaz and Artuz[20]	Yadav *et al*.[18]
	N = 50	*N* = 40	*N* = 67	*N* = 46
Pitting	39 (76%)	31 (77.5%)	39 (58.2%)	18 (39.1%)
Dilated capillaries	32 (64%)		24 (35.8%)	9 (19.6)
Red spots in lunula		2 (5%)	1 (1.5%)	–
Leukonychia	2 (4%)	37 (92.5%)	4 (6%)	–
Splinter hemorrhages	3 (6%)	32 (80%)	49 (73.1%)	5 (10.9%)
Crumbling	24 (48%)	8 (20%)	12 (18%)	–
Subungual hyperkeratosis	20 (40%)	13 (32.5%)	6 (9%)	–
Oil drop/Salmon patch	25 (50%)	19 (47.5%)	11 (16.4%)	2 (4.4)
Onycholysis	32 (64%)	31 (77.5%)	37 (55.2%)	10 (21.7%)
Subungual pustules	1(2%)	–	–	–

palmoplantar psoriasis was the second most common type (eight patients), followed by scalp psoriasis (three patients). There was one patient each of pustular, erythrodermic, and arthropathic psoriasis. The remaining four patients had no associated cutaneous/mucosal/scalp/joint involvement.

Dermoscopically, the most common nail finding was coarse irregular pitting (39 [76%]), followed by onycholysis (32 [64%]) and irregular dilated tortuous capillaries (32 [64%]). These observations were in concordance with those made in the Indian studies by Yadav *et al*.,[18] whereas Polat *et al*.,[19] in the study done in Turkey, reported leukonychia as the most common dermoscopic finding. We also observed that in one patient pitting was not seen clinically but could be observed on dermoscopy as it allows higher magnification. The same was the case with onycholysis. A patient with minimal onycholysis was missed on clinical examination but could be picked on dermoscopy. Also, in around four patients, the classic erythematous border surrounding onycholysis could not be made out clinically but was observed distinctly on dermoscopy. This finding is considered specific to nail psoriasis. Other findings observed were salmon patch (25 [50%]), crumbling (24 [48%]), splinter hemorrhages (20 [40%]), transverse or longitudinal ridges (14 [28%]), and subungual pustules (1 [2%]). In contrast, Yadav and Khopkar[18] reported salmon patch in only 2 of 46 patients in their study. Yorulmaz and Artuz[20] also observed that dilated tortuous capillaries are associated with the disease severity. This aspect was not studied in our study. Yorulmaz and Artuz[20] also described pseudo-fiber sign as a dermoscopic feature in nail bed psoriasis seen as red and black filamentous structures under distal free edge on hyponychium or nail plate detached areas. This finding was not seen in our study. Dermoscopic features suggestive of onychomycosis are jagged proximal edge, subungual hyperkeratosis, and leukonychia,[21] out of which a jagged proximal edge is strongly associated with onychomycosis and not seen in psoriatic nail. Various dermoscopic features were compared with previous studies and depicted in Table 2.

Histopathologically, the most common finding was parakeratosis (41 [82%]) followed by hypergranulosis (40 [80%]), psoriasiform epidermal hyperplasia (33 [66%]), neutrophils in epidermis (32 [64%]), dilated blood vessels in papillary dermis (30 [60%]), and orthohyperkeratosis (16 [32%]). Our findings were compared with previous

Table 3: Comparison of histopathological features with previous studies

Histopathological feature	Present study	Kaul *et al*.[14]	Grover *et al*.[7]	Hanno *et al*.[6]
	N = 50	*N* = 60	*N* = 22	*N* = 4
Hyperkeratosis (HK) and parakeratosis (PK)	41 (82%)	47 (78.3%)	20 (90.9%)	4 (100%)
Psoriasiform hyperplasia	33 (66%)	32 (53.3%)	16 (72.7%)	1 (25%)
Dilated capillaries	30 (60%)	28 (46.6%)	19 (86.3)	4 (100%)
Neutrophilic infiltration	32 (64%)	38 (63.3%)	18 (82%)	4 (100%)
Hypergranulosis	40 (80%)	35 (58.3%)	7 (31.8%)	4 (100%)
Serum exudates	4 (8%)	26 (43.3%)	8 (36.3%)	1 (25%)
Melanin	–	17 (28.3%)	–	–
Acanthosis	1 (2%)	14 (23.3%)	–	–
Spongiosis	5 (10%)	–	–	–
Papillomatosis	2 (4%)	–	–	–
Hemorrhages	–	13 (21.6%)	–	–
PAS stain	4 (8%)	16 (26.6%)	6 (27.2%)	–

studies and depicted in Table 3. These were in concordance with the findings observed in the studies by Hanno *et al*.[6] and Grover *et al*.,[7] which also reported parakeratosis to be the most common histopathological finding (90.9% and 100%, respectively). Hypergranulosis, which was the second most common finding in our study, was reported in 100% of cases in a study by Hanno *et al*.[6] but was reported in only 36.3% in a study by Grover *et al*.[7] The presence of neutrophils in epidermis was proposed as a major diagnostic criterion by Hanno *et al.*[6] for diagnosis of nail psoriasis and was seen in 32 of 50 (64%) of our patients. Hanno *et al.*[6] and Grover *et al.*[7] reported this feature in 100% and 82% of the patients, respectively. This discrepancy could be due to the small sample size of four in the study by Hanno *et al*.[6] Less frequently seen findings were spongiosis (5 [10%]), serum exudates (4 [8%]), papillomatosis (2 [4%]), and acanthosis (1 [2%]).

In one patient among the classified nondiseased cases, clinically onycholysis and brown patch on fingernails were seen. It showed band-like lichenoid infiltrate and hypergranulosis throughout the epidermis with focal basal cell vacuolar degeneration on histopathology and was diagnosed as nail lichen planus.

PAS stain was positive in five patients (10%), which was performed on tissue specimens to evaluate the presence of fungal elements. Yeast cells were seen in four cases and hyphae in orthohyperkeratotic and parakeratotic epithelium in one case. As psoriatic nails are predisposed to increased fungal colonization, we considered that one case with fungal invasion as true onychomycosis. Hence, among the 10 nondiseased patients, one patient was diagnosed with nail lichen planus and one with onychomycosis. Hence, histopathology with dermoscopy helps to diagnose nail psoriasis mimickers accurately, hence enabling appropriate treatment.

The mean NPQ10 scale score in our study was 22.9, higher in contrast to the study by Klaassen *et al*.[22] where it was 9.9. Females with nail psoriasis had a poor QOL compared with males in the study, which was statistically significant ($P < 0.05$). Similar findings were reported in studies by Ortonne *et al.*[11] and Klaassen *et al.*,[22] wherein the scores were higher for females but statistical significance was not evaluated.

Association of QOL with duration of nail disease and that with the number of nails involved by Chi-square test ($P > 0.05$) was found to be not significant. There are no studies that evaluated these aspects of nail psoriasis.

Similarly, we found no significant association between the duration of skin involvement in the disease and the QOL in our study ($P > 0.05$). This was in contrast to the study done by Daulatabad *et al.*,[12] which reported a significant correlation.

Pearson coefficient of correlation was used to study the impact of nail psoriasis on the QOL by correlating NAPSI score and NPQ10 scale score. It was 0.6535 signifying moderate positive correlation between NAPSI score and NPQ10 scale score. Hence, the greater the nail involvement, the greater the impact on QOL. A study by Daulatabad *et al.*[12] found weakly positive correlation between the two scores. The weakly positive correlation in Daulatabad *et al*.'s[12] study could be due to the fact that questions used in the original NPQ10 scale may not be particularly relevant to Indian patients. We modified the scale to better suit the Indian population as difficulty in driving cars and wearing socks or stockings may not be important in Indian population. Western studies such as Klaassen *et al*.'s[22] study reported the correlation between NPQ10 score and Psoriasis Area Severity Index.

In our study, after applying criteria devised for the diagnosis of nail psoriasis, 27 patients out of 50 could be diagnosed clinically, whereas 31 and 32 patients out of 50 could be diagnosed dermoscopically and histopathologically, respectively. Patients who did not satisfy any of the above three criteria were classified as nondiseased.

The sensitivity and specificity of clinical evaluation were found to be 67.5% and 70%, respectively, and that of dermoscopic and histopathological evaluation was 77.5%, 80%, and 80%, 100%, respectively. Ally Essayed *et al.*'s[23] study noticed an increase in the nail plate thickness in the thumb and the index finger over 0.63 and 0.61 mm, respectively, as a manifestation of nail psoriasis had a sensitivity of 72% and 60% and specificity of 70% and 88%, respectively. The thickness of the thumbnail bed of over 1.85 mm (sensitivity of 64% and specificity of 72%) had a similar diagnostic value in this examination. The thickness of the index fingernail bed of over 1.89 had a similarly high sensitivity (64%) but much lower specificity (34%). Sari *et al.*'s[24] study showed dermoscopy examination to detect nail psoriasis compared with histopathological examination as the gold standard had a diagnostic test sensitivity of 75% and specificity of 40%. In Garbers *et al.*'s[25] study, the histological finding of marked extensive parakeratosis had a sensitivity of 88.5%, but a specificity of 42.9% compared with other psoriatic patients without clinically evident nail involvement. So, in our study, the specificity of dermoscopic and histopathological evaluation of nail psoriasis was significantly more (80% and 100%, respectively).

Conclusion

Nail biopsy, though painful and difficult to perform, is the most efficient method to diagnose nail psoriasis. With surgical precision in nail biopsy and pathological expertise, the yield of histopathological examination can be increased. Dermatologists should not hesitate to do a nail biopsy as it helps to rule out various nail psoriasis mimickers such as lichen planus, onychomycosis, etc., as shown by our study. Diagnosing nail psoriasis at an early stage allows prompt and adequate treatment, thus preventing future misery to the patient. Dermoscopy can help visualize minute features that can be easily missed on naked eye examination. It can also help in differentiating nail psoriasis and onychomycosis, which is extremely difficult to differentiate on histopathology. Because the treatment of both these entities is different, dermoscopy should be considered an irreplaceable part of examination in nail disorders. Nail psoriasis does impact the QOL of patients especially in females who feel embarrassed in social gatherings and workplace. Hence, a dermatologist should spend some time counseling the patients about this to relieve their anxiety and reassure them that it is not an infectious disease.

Limitations

It was a cross-sectional observational study. There was no control group to compare the findings with. The sample size of the study was small. Larger controlled studies in future may add more significance to these conclusions. No intervention was done in the study. It would be interesting to know if treating coexisting onychomycosis improves nail psoriasis. The study population was taken from a metropolitan city. It would be interesting to know the outcomes if study was done in other districts and rural settings. Histopathological criterion for nail psoriasis needs to be redevised as it was established after studying four patients of nail psoriasis, and the major criterion—neutrophils in epidermis—may not be seen in all patients, hence missing the diagnosis in such cases.

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Conflicts of interest

There are no conflicts of interest.

References

1. Armstrong AW, Harskamp CT, Armstrong EJ. Psoriasis and metabolic syndrome: 1. A systematic review and meta-analysis of observational studies. J Am Acad Dermatol 2013;68:654-62.
2. Armesto S, Esteve A, Coto-Segura P, Drake M, Galache C, Martínez-Borra J, *et al*. Nail psoriasis in individuals with psoriasis vulgaris: A study of 661 patients. Actas Dermosifiliogr 2011;102:365-72.
3. Augustin M, Reich K, Blome C, Schäfer I, Laass A, Radtke MA. Nail psoriasis in Germany: Epidemiology and burden of disease. Br J Dermatol 2010;163:580-85.
4. De Jong EM, Seegers BA, Gulinck MK, Boezeman JB, van de Kerkhof PC. Psoriasis of the nails associated with disability in a large number of patients: Results of a recent interview with 1728 patients. Dermatology 1996;193:300-3.
5. Tan ES, Chong WS, Tey HL. Nail psoriasis: A review. Am J Clin Dermatol 2012;13:375-88.
6. Hanno R, Mathes BM, Krull EA. Longitudinal nail biopsy in evaluation of acquired nail dystrophies. J Am Acad Dermatol 1986;14:803-9.
7. Grover C, Reddy BSN, Chaturvedi KU. Diagnosis of nail psoriasis: Importance of biopsy and histopathology. Br J Dermatol 2005;153:1153-8.
8. Zaias N. Psoriasis of the nail. A clinical-pathologic study. Arch Dermatol 1969;99:567-79.
9. Lewin K, DeWit S, Ferrington RA. Pathology of the finger nail in psoriasis. A clinicopathological study. Br J Dermatol 1972;86:555-63.
10. Rich P, Scher RK. Nail psoriasis severity index: A useful tool for evaluation of nail psoriasis. J Am Acad Dermatol. 2003;49:206-12.
11. Ortonne JP, Baran R, Corvest M, Schmitt C, Voisard JJ, Taieb C. Development and validation of nail psoriasis quality of life scale (NPQ10). J Eur Acad Dermatol Venereol 2010;24:22-7.
12. Daulatabad D, Grover C, Kashyap B, Dhawan AK, Singal A, Kaur IR. Clinical and serological characteristics of nail psoriasis in Indian patients: A cross-sectional study. Indian J Dermatol Venereol Leprol 2017;83:650-5.
13. De Berker DAR, Baran R. Disorders of nails. In: Burns T, editor. Rook's Textbook of Dermatology. 8th ed. Singapore: Wiley-Blackwell; 2010. p. 65.23-6.
14. Kaul S, Singal A, Grover C, Sharma S. Clinical and histological spectrum of nail psoriasis: A cross-sectional study. J Cutan Pathol 2018;45:824-30.
15. Kumar R, Sharma A, Dogra S. Prevalence and clinical patterns of psoriatic arthritis in Indian patients with psoriasis. Indian J Dermatol Venereol Leprol 2014;80:15-23.
16. Kaur I, Saraswat A, Kumar B. Nail changes in psoriasis: A study of 167 patients. Int J Dermatol 2001;40:601-3.
17. Brazzelli V, Carugno A, Alborghetti A, Grasso V, Cananzi R, Fornara L, *et al*. Prevalence, severity and clinical features of psoriasis in fingernails and toenails in adult patients: Italian experience. J Eur Acad Dermatology Venereol 2012;26:1354-9.

18. Yadav TA, Khopkar US. Dermoscopy to detect signs of subclinical nail involvement in chronic plaque psoriasis: A study of 68 patients. Indian J Dermatol 2015;60:272-5.
19. Polat A, Kapicioglu Y. Dermoscopic findings of psoriatic nail and their relationship with disease severity. Turkderm Arch Turk Dermatol Venerol 2017;51:119-23.
20. Yorulmaz A, Artuz F. A study of dermoscopic features of nail psoriasis. Postepy Dermatol Alergol 2017;34:28-35.
21. Yorulmaz A, Yalcin B. Dermoscopy as a first step in the diagnosis of onychomycosis. Postepy Dermatol Alergol 2018;35:251-8.
22. Klaassen KM, van de Kerkhof PC, Pasch MC. Nail psoriasis: A questionnaire-based survey. Br J Dermatol 2013;169:314-9.
23. Ally Essayed SM, Al-Shatouri MA, Nasr Allah YS, Atwa MA. Ultrasonographic characterization of the nails in patients with psoriasis and onychomycosis. Egypt J Radiol Nucl Med 2015;46:733-9.
24. Sari AK, Roesyanto–Mahadi ID, Nababan KA, Siregar R. Diagnostic analysis of dermoscopy on nail psoriasis. Int J Sci Res Publi 2019;9:31-4.
25. Garbers LEFM, Slongo H, Fabricio LHZ, Schmitt JV, Bonalumi Filho A. Incidence, clinical manifestations and clipping of nail psoriasis in the dermatology center of the Hospital Universitário Evangélico de Curitiba. An Bras Dermatol 2016;91: 300-5.