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Psoriatic nail involvement in Malaysia: A 14-year registry review (2007-2020)

Wen Foong Tan, AdvMDerm*, Suganthy Robinson, AdvMDerm, Min Moon Tang, AdvMDerm, Malaysian Psoriasis Registry Working Group

Department of Dermatology, Hospital Kuala Lumpur, Ministry of Health Malaysia, Kuala Lumpur

Abstract Nail psoriasis affects 20% to 30% of psoriasis patients and is an early predictor of psoriatic arthritis (PsA). We evaluated the prevalence, clinical characteristics, and impact on quality of life of patients with nail psoriasis. We conducted a multicenter retrospective cohort study of patients registered with The Malaysian Psoriasis Registry from January 1, 2007 to December 31, 2020. Of the 24,147 patients, 13,081 (54.2%) had nail psoriasis. Patients with nail psoriasis had later onset of psoriasis (34.0 ± 16.6 years vs 32.9 ± 17.6 years, $P < .001$) and longer disease duration (11.4 ± 10.5 years vs 8.5 ± 9.4 years, $P < .01$), with a man-to-woman ratio of 1.2:1. They were more likely to have a family history of psoriasis, cardiometabolic diseases, smoking history, higher body mass index, severe disease, PsA, face and scalp involvement, and higher mean Dermatology Life Quality Index scores (9.36 ± 6.84 vs 8.87 ± 6.60). Systemic treatment and biologics were more commonly prescribed in this cohort (25.0% vs 13.2%, $P < .001$). Overall, 54.2% of the Malaysian Psoriasis Registry patients had nail involvement. Nail psoriasis was associated with longer duration of psoriasis, older age of onset, male sex, and a family history of psoriasis. It proved to be an important predictor for PsA, severe psoriasis, face and scalp involvement, increased cardiometabolic risk, and a greater impairment of quality of life.

Psoriasis is a chronic T cell-mediated cutaneous disorder that affects 2% to 3% of the general population.[1] It typically presents with scaly erythematous plaques with varying thickness and may be associated with nail and/or musculoskeletal involvement. Gene-environment interactions contribute to the clinical manifestations of psoriasis.[2] Psoriasis is associated with multiple comorbidities, including psoriatic arthritis (PsA), cardiometabolic diseases, obesity, nonalcoholic fatty liver disease, chronic kidney disease, inflammatory bowel disease, lymphoma, alcohol abuse, and depression.[2] This can be explained by the common pathogenic pathway with high T helper 1 and T helper 17 expression, which leads to chronic local and systemic inflammation.[2]

The lifetime incidence of nail psoriasis has been reported to be 80% to 90%.[3] Approximately 5% to 10% of patients may have exclusive nail psoriasis.[4,5] The prevalence of nail signs is ≤40% in patients with mild psoriasis compared to 50% to 70% in patients with severe psoriasis.[6]

To date, limited information exists regarding the epidemiology and clinical characteristics of nail psoriasis in Malaysia. This study evaluated the prevalence, clinical characteristics, associated factors, and impact of quality of life (QOL) in psoriasis patients with nail involvement in Malaysia.

* Corresponding author.
E-mail address: wftan85@gmail.com (W.F. Tan).

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Methods

This was a retrospective multicenter cohort study involving data retrieval from the Malaysian Psoriasis Registry (MPR) from January 1, 2007 to December 31, 2020. Approval from the Malaysian Research and Ethics Committee was obtained on June 20, 2022, before study commencement (NMRR-ID-22-01174-EAC). The study was conducted in accordance with the Declaration of Helsinki. The MPR is a prospective clinical registry that collects data on psoriasis patients in Malaysia from 38 outpatient dermatology clinics, which are tertiary referral centers in the country. A recent publication on the prevalence of psoriasis in Johor Bahru, a city in Malaysia, reported a prevalence rate of 0.34%.[7] From the Department of Statistics Malaysia, the population of Malaysia was estimated to be 32.6 million in 2020.[8] With a prevalence rate of 0.34%, its estimated that there were 110,840 psoriasis patients in Malaysia in 2020. The MPR has covered 21.8% of psoriasis patients in Malaysia in 2020. Notifications were performed for all patients at the initial review. For patients receiving phototherapy, systemic treatment, or biologics, notifications were performed 6 months thereafter.

The diagnosis of psoriasis was made through clinical evaluation by a dermatologist. Sociodemographic and clinical information were obtained using a structured clinical registry form. Psoriasis severity was assessed based on body surface area involvement. Mild psoriasis was defined as affected body surface area <5%, moderate as body surface area 5% to 10%, and severe as body surface area >10%.[9]

The Dermatology Life Quality Index is a self-administered questionnaire that assesses the impact of skin disease on the QOL in adults aged ≥16 year.[10] This questionnaire consists of 10 questions that covers six domains, namely symptoms and feelings, daily activities, leisure, work and school, personal relationships, and treatment. Each question is given a score of 0 (not at all) to 3 (very much). A total score of ≥10 indicates a very large to an extremely large effect on a patient's QOL.[10]

All statistical analyses were performed using the Statistical Package for Social Sciences for Windows, SPSS 22.0 (SPSS Inc, Chicago, Illinois). Continuous variables are presented as means and standard deviations if they were normally distributed or median and interquartile range if not. Categorical variables are reported as proportions and percentages.

Comparisons were made between those with and without nail psoriasis. Categorical data were analyzed using χ^2 or Fisher's exact test. Analysis of continuous data was performed using the independent t test. A P value of <.05 was considered statistically significant.

Results

Demographics and comorbidities

A total of 24,147 psoriasis patients were included in this study. Of these, 55% (13,292) were men. The mean age of onset of psoriasis was 33.4 ± 17.1 years with a mean disease duration of 10.1 ± 10.1 years. Approximately one-quarter (24.0%) of patients reported a family history of psoriasis. The demographics and clinical characteristics of all patients are summarized in Table 1.

Nail involvement

Of 24,147 patients, 13,081 (54.2%) reported nail involvement. The mean age of onset of psoriasis in patients with nail psoriasis was significantly higher than in patients without nail involvement (34.0 ± 16.6 years vs 32.9 ± 17.6 years). Patients with nail involvement had a longer disease duration (11.4 ± 10.5 years vs 8.5 ± 9.4 years) than those without. The man-to-woman ratio was 1.2:1. The most frequently reported nail manifestations were nail pitting (9,322; 71.3%), followed by onycholysis (6,046; 46.2%), nail discoloration (3,288; 25.1%), subungual hyperkeratosis (1,584; 12.1%), and total nail dystrophy (656; 5.0%).

Family history of psoriasis ($P < .001$) and comorbidities such as hypertension, hyperlipidemia, diabetes mellitus, ischemic heart disease, and cerebrovascular disease were more prevalent in patients with nail involvement ($P < .001$) than in those without nail involvement. Additionally, a higher body mass index and a history of smoking were associated with nail involvement ($P < .001$). Six patients had exclusive nail disease; however, none of them had joint involvement. The mean age of onset for these patients was 38.3 ± 7.2 years.

The most common type of psoriasis presentation in the nail psoriasis group was plaque psoriasis (11,698; 93.8%), followed by guttate psoriasis (297; 2.4%), erythrodermic psoriasis (263; 2.1%), inverse psoriasis (47; 0.4%), pustular psoriasis (127, 1.0%), and palmoplantar nonpustular psoriasis (39; 0.3%). Interestingly, nail psoriasis was mostly seen in patients with erythrodermic psoriasis (75.6%) followed by the localized pustular subtype (65.7%).

More than half of the patients (5,717; 59.4%) with moderate to severe psoriasis had nail involvement. Nail psoriasis was associated with a higher rate of face or scalp involvement, PsA, enthesitis or dactylitis, and joint deformity compared to those without nail psoriasis ($P < .001$ for all). Of all joint presentations, there were more rheumatoid-like joint involvement in those with nail involvement ($P = .003$) than those without. Of those patients with PsA, nail pitting (1,508; 50.0%) was most reported, followed by onycholysis (1,122;

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Table 1 Demographics and clinical characteristics of patients with and without nail psoriasis.

Demography and clinical characteristic	Nail involvement (N = 13,081)	No nail involvement (N = 11,066)	*P*
Age, y	45.4 ± 17.0	41.3 ± 18.4	<.001
Age at onset of psoriasis, y	34.0 ± 16.6	32.9 ± 17.6	<.001
Duration of psoriasis, y	11.4 ± 10.5	8.5 ± 9.4	<.001
Sex			<.001
Men	7,943 (60.7)	5,349 (48.3)	
Women	5,138 (39.3)	5,717 (51.7)	
Ethnicity			
Malay	6,787 (52.0)*	6,649 (60.2)†	
Chinese	2,801 (21.5)*	1,716 (15.5)†	
Indian	2023 (15.5)*	1,881 (17.0)†	
Others	1,442 (11.0)*	800 (7.2)†	
Family history	3,264 (25.0)	2,536 (22.9)	<.001
Comorbidities			
Ischemic heart disease	783 (6.0)	508 (4.6)	<.001
Cerebrovascular disease	255 (1.9)	141 (1.3)	<.001
Diabetes mellitus	2,406 (18.4)	1,770 (16.0)	<.001
Hypertension	3,708 (28.3)	2,542 (23.0)	<.001
Hyperlipidemia	2,761 (21.1)	1,648 (14.9)	<.001
Smoking history	3,632 (27.8)	1924 (17.4)	<.001
Mean BMI, kg/m^2	26.8 ± 6.0	26.4 ± 6.3	<.001
Psoriasis subtypes			
Plaque	11,698 (93.8)‡	9,769 (93.6)§	
Guttate	297 (2.4)‡	372 (3.6)§	
Erythrodermic	263 (2.1)‡	85 (0.8)§	
Flexural/inverse	47 (0.4)‡	68 (0.7)§	
Generalized pustular	81 (0.6)‡	85 (0.8)§	
Localized pustular	46 (0.4)‡	24 (0.2)§	
Palmoplantar nonpustular	39 (0.3)‡	36 (0.3)§	
Psoriasis severity (BSA)			
<5%	3,914 (40.6)‖	4,644 (58.8)¶¶	
5%-10%	3,010 (31.3)‖	2,211 (28.0)¶¶	
11%-90%	2,505 (26.0)‖	1,003 (12.7)¶¶	
>90%	202 (2.1)‖	44 (0.5)¶¶	
Moderate to severe (BSA ≥ 5%)	5,717 (59.4)‖	3,258 (41.2)¶¶	<.001
Severe (BSA > 10%)	2,707 (28.1)‖	1,047 (13.2)¶¶	<.001
Special sites			
Face	7,192 (55.0)	4,027 (36.4)	<.001
Scalp	11,219 (85.8)	9,360 (84.6)	<.001
Psoriatic arthropathy	2,212 (16.9)	892 (8.1)	<.001
Enthesitis/dactylitis	299 (2.3)	76 (0.7)	.020
Joint deformity	499 (3.8)	125 (1.1)	<.001
Joint presentation			
Oligo-/monoarthropathy	834 (34.1)**	343 (38.1)††	.360
Distal hand joints arthropathy	713 (29.1)**	268 (29.8)††	.560
Rheumatoid-like	652 (26.6)**	210 (23.3)††	.003
Spondylitis/sacroiliitis	188 (7.7)**	58 (6.4)††	.110
Arthritis mutilans	61 (2.5)**	22 (2.4)††	.790
Treatment in the past 6 mo			
Topical	12,210 (93.3)	9,963 (90.0)	<.001
Phototherapy	434 (3.3)	154 (1.4)	<.001
Systemic	3,265 (25.0)	1,456 (13.2)	<.001
Methotrexate	2,165 (66.3)	1,006 (69.1)	<.001
Acitretin	678 (20.8)	257 (17.6)	<.001
Sulfasalazine	175 (5.4)	60 (4.1)	<.001

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Table 1 (*continued*)

Demography and clinical characteristic	Nail involvement (N = 13,081)	No nail involvement (N = 11,066)	*P*
Cyclosporine	135 (4.1)	72 (5.0)	.002
Corticosteroids	112 (3.4)	61 (4.2)	.025
Biologics	120 (0.9)	68 (0.6)	.009
TNFα inhibitors	40 (33.3)	30 (44.1)	
IL12/23 inhibitors	35 (29.2)	13 (19.1)	
IL17 inhibitors	34 (28.3)	20 (29.4)	
IL23 inhibitors	8 (6.7)	4 (5.9)	
Anti-CD11a antibody	3 (2.5)	1 (1.5)	
Mean DLQI	9.36 ± 6.84‡‡	8.87 ± 6.60§§	<.001
Symptoms and feelings	2.69 ± 1.56	2.69 ± 1.57	.720
Daily activities	2.00 ± 1.73	1.91 ± 1.70	<.001
Leisure	1.98 ± 1.85	1.86 ± 1.79	<.001
Work and school	0.74 ± 0.97	0.65 ± 0.91	<.001
Personal relationships	1.14 ± 1.45	1.05 ± 1.36	<.001
Treatment	0.91 ± 0.93	0.79 ± 0.90	<.001
DLQI > 10	4,670 (38.1)‡‡	3,591 (36.4)§§	.009

Data shown as mean ± SD or n (%).
BMI, body mass index; BSA, body surface area; DLQI, Dermatology Life Quality Index; IL, interleukin; TNF, tumor necrosis factor.
* n = 13,053.
† n = 11,046.
‡ n = 12,471.
§ n =10,439.
‖ n = 9,631.
¶¶ n = 7,902.
** n= 2,448.
†† n = 901.
‡‡ n = 12,261.
§§ n = 9,870.

37.2%), nail discoloration (653; 21.7%), subungual hyperkeratosis (329; 10.9%), and nail dystrophy (128; 4.2%). Joint disease was significantly associated with the presence of nail matrix and nail bed involvement ($P < .001$).

Patients with nail psoriasis were more likely to be receiving phototherapy ($P < .001$), systemic therapy ($P < .001$) and biologics ($P = .009$) than those without nail psoriasis. The mean Dermatology Life Quality Index was higher in those with nail involvement (9.36 ± 6.84 vs 8.87 ± 6.60) than those without nail involvement, and more than a third (4,670; 38.1%) of patients with nail psoriasis had a very large to an extremely large impairment of QOL. Comparison of Dermatology Life Quality Index scores between patients with and without nail psoriasis is shown in Figure 1. The domain that was most affected in nail psoriasis patients was symptoms and feelings, as depicted in Figure 2, whereas the least affected domain was personal relationships.

Discussion

At present, epidemiologic data on nail psoriasis are limited. This study was conducted to gain insight on the local prevalence, clinical characteristics, and impact on QOL of nail psoriasis patients.

Numerous studies have reported the prevalence of nail psoriasis ranging from 40% to 80%, similar to that observed in our study.[3,5,11-16] Nail involvement was more prevalent among patients with longer duration of psoriasis with a mean duration of >10 years.[3,5,11-13,17] Male preponderance for nail psoriasis has been reported[3,5,17]; however, one review[5] did not find any sex difference. Men may be affected more because they tend to experience more severe symptoms, prompting them to seek treatment earlier.[18] Occupational activities involving manual labor may induce the Koebner phenomenon. We are uncertain of the potential protective effects of nail polish or manicures, which may be used more frequently among women. Researchers in Greece observed an older age of onset in patients with nail psoriasis, corresponding to our findings.[12] A study reported a younger age of onset, ranging from 24 to 27 years.[16] A cross-sectional analysis did not find any age difference.[17] A comparison of our present study with previous studies is summarized in Table 2.

Nail psoriasis was associated with a family history of psoriasis, which was also described in Germany and Spain.[3,17] The presence of HLA-Cw*0602 was not associated with

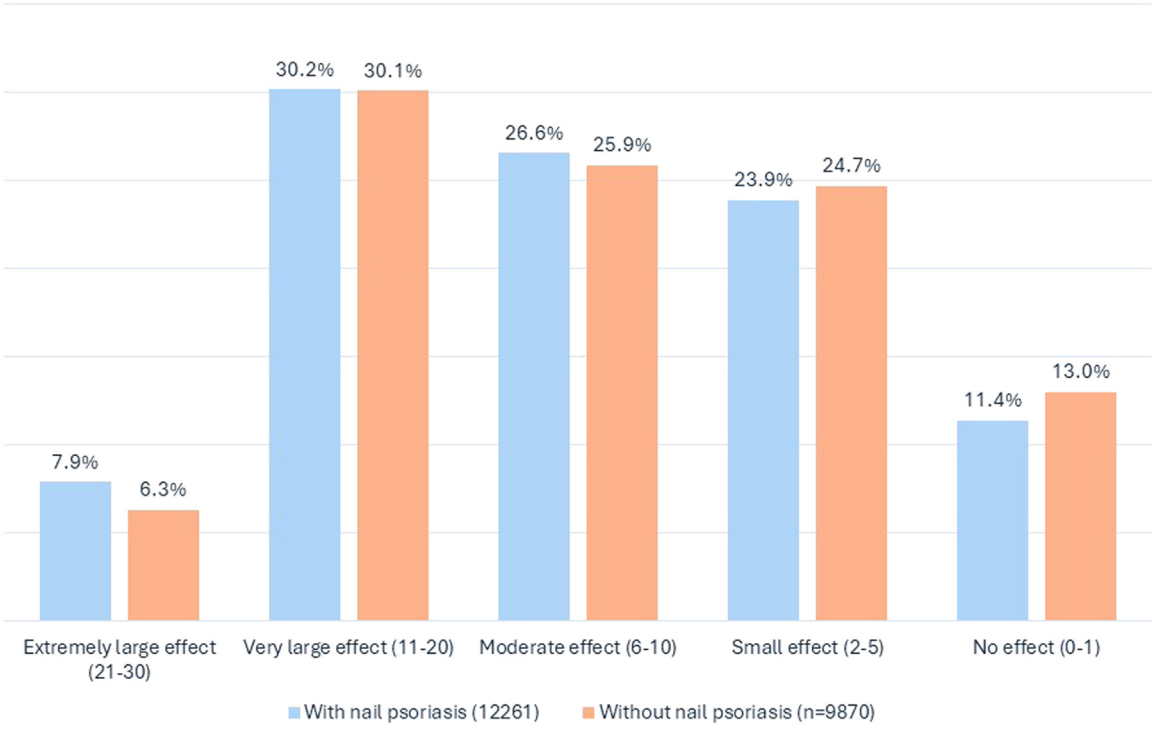

Fig. 1 Dermatology Life Quality Index scores of psoriasis patients with and without nail psoriasis (N = 22,131).

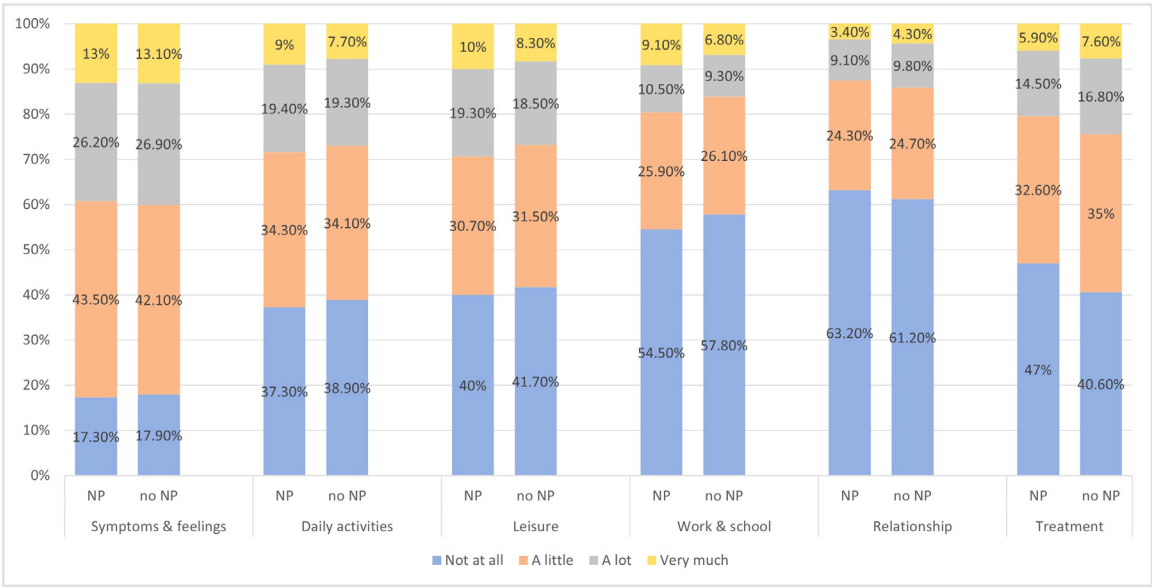

Fig. 2 Comparison of Dermatology Life Quality Index domain scores between patients with and without nail psoriasis. NP, nail psoriasis.

nail psoriasis.[19] On the contrary, no difference in family history of psoriasis between those with and without nail psoriasis was observed in an evaluation of 228 psoriatic patients.[12]

Nail psoriasis can be divided into nail matrix and/or nail bed involvement. Nail matrix involvement includes nail pitting, leukonychia, red lunula, Beau's lines (transverse grooves), onychomadesis, and nail dystrophy, whereas nail bed involvement encompasses onycholysis, subungual hyperkeratosis, salmon oil spot, and splinter hemorrhage.[2,20] We found that the most common nail manifestation was nail pitting, similar to some studies[11,14-16]; however, other reports have found that subungual hyperkeratosis,[5,21] onycholysis,[22] and salmon oil spot[12] are the most common manifestations.

Table 2 Comparison of current study with previous studies.

Characteristics	Current study	Radtke et al,[13] 2011	De Jong et al,[15] 1996	Klaassen et al,[16] 2013	Augustin et al,[3] 2010	Kyriakou et al,[12] 2011
Country	Malaysia	Germany	Netherlands	Netherlands	Germany	Greece
Number of participants	24,147	2,449	1,728	1,459	3,473	228
Age, y	43.5 ± 17.7	57.0 ± 11.7	47.0 ± 14.0	57.5 ± 13.7	51.1 ± 15.3	52.2 ± 15.5
Age of onset, y	33.4 ± 17.1	—	—	25.7 ± 15.1	19.7 ± 15.0	40.9 ± 18.3
Duration of psoriasis, y	10.1 ± 10.1	—	24.0 ± 15.0	31.7 ± 15.9	—	11.2 ± 11.5
Women	10,855 (45.0)	1,078 (44.8)	—	736 (50.4)	1,473 (42.4)	140 (61.4)
Family history	5,800 (24.0)	—	—	918 (62.9)	1,374 (39.6)	58 (25.4)
Psoriatic arthropathy	3,104 (12.9)	—	838 (48.5)	597 (40.9)	631 (18.2)	75 (39.2)
Patients with nail psoriasis						
Nail psoriasis	13,081 (54.2)	1,730 (72.8)	1,369 (79.2)	963 (66.0)	1,430 (41.2)	152 (66.7)
Duration of psoriasis, y	11.4 ± 10.5	34.3 ± 13.9	—	32.4 ± 15.3	women 23.1 ± 15.8 men 21.4 ±13.5	11.7 ± 11.7
Age of psoriasis onset, y	34.0 ± 16.6	—	—	24.4±14.0	—	41.5 ± 18.2
Men	7,943 (60.7)	—	—	489 (50.8)	910 (63.6)	—
Family history	3,264 (25.0)	—	—	621 (64.5)	628 (43.9)	39 (25.7)
Nail features						
Pitting	9,322 (71.3)	—	1,031 (75.3)	630 (65.4)	—	88 (57.9)
Onycholysis	6,046 (46.2)	—	632 (46.2)	556 (57.7)	—	116 (76.3)
Discoloration	3,288 (25.1)	—	400 (29.2)	—	—	—
Subungual hyperkeratosis	1,584 (12.1)	—	—	324 (33.6)	—	77 (50.7)
Nail dystrophy	656 (5.0)	—	902 (65.9)	—	—	63 (41.4)
Leukonychia	—	—	—	309 (32.1)	—	44 (28.9)
Oil drop discoloration	—	—	—	399 (41.4)	—	121 (79.6)
Scalp involvement	11,219 (85.8)	—	—	729 (75.8)	—	—
Psoriatic arthropathy	2,212 (16.9)	—	—	446 (46.3)	371 (25.9)	54 (35.5)
DLQI	9.4 ± 6.8	7.2 ± 6.4	—	—	Women 9.5 ± 7.1 Men 8.6 ± 7.1	-
DLQI > 10	4,670 (38.1)	—	—	—	492 (34.4)	-

Data shown as mean ± SD or n (%).
DLQI, disease life quality index.

The diagnosis of nail psoriasis is usually made clinically. It may mimic nail conditions such as onychomycosis, traumatic nail disorders, nail lichen planus, and parakeratosis pustulosa. Nail pitting is characteristic but not pathognomonic for psoriasis. Pitting in psoriasis is more irregular and deeper.[2,20] In addition, affected nails are also prone to fungal infection.[23] A matrix or nail bed biopsy may be performed in selected cases. The typical histologic features of nail psoriasis are hyperkeratosis, focal areas of parakeratosis, regular epidermal acanthosis, dilated capillaries in the papillary dermis, and neutrophil infiltrates. Spongiosis and serum-like exudates are also seen in nail psoriasis.[20] Staining with periodic acid–Schiff is recommended if onychomycosis is considered.[2]

Plaque psoriasis was most common among patients with nail psoriasis, consistent with previous studies.[12,14,16] An analysis in South Korea reported that 10% of the cohort had localized pustular psoriasis, and all had nail psoriasis. These patients had more severe nail disease involving the nail matrix and nail bed[11]; however, the same finding was not observed in a study in the Netherlands.[16] Special areas refer to visible areas that have a more significant impact on QOL. These areas include the face, scalp, palms, soles, nails, and genitals.[24] Research reported that nail psoriasis was more frequently associated with scalp (75.8%), genital (32.7%), and inverse psoriasis (26.5%).[16] A Danish cohort demonstrated that nail psoriasis conferred a 2.7-fold higher risk of scalp psoriasis.[24] A cross-sectional study in Korea described a higher proportion of patients with nail psoriasis having scalp involvement (66.7% vs 51.7%) but a lower proportion of patients with face (36.8% vs 37.9%) and genital involvement (19.9% vs 20.7%).[11] Having psoriasis in a single special area predisposes a patient to increased risk of involvement of other special areas. Severe psoriasis also confers a higher risk of involvement of these areas.[24]

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Nail psoriasis is an independent predictor of PsA.[25] Studies have found a higher prevalence of PsA among psoriasis patients with nail involvement, ranging from 26% to 46%.[3,5,12,16,17] It is estimated that about 20% to 30% of psoriasis patients will develop PsA during their lifetime. Nail psoriasis is present in 80% of patients with PsA.[22,26] A cohort study reported that nail dystrophy was associated with three times higher risk of developing PsA.[27] Irreversible joint damage is found in about half of the patients with PsA within the first few years of diagnosis.[27] Early diagnosis of nail psoriasis is of paramount importance as it is a predictor of subclinical PsA.[26]

Furthermore, we found that nail psoriasis was associated with increased risk of enthesitis and dactylitis, which was also demonstrated in the Corrona Psoriatic Arthritis/Spondyloarthritis Registry.[25] Enthesitis is strongly associated with nail psoriasis due to the proximity of the extensor tendon of the distal interphalangeal joint with the nail matrix. This has been demonstrated on imaging, and enthesitis is almost always present in early PsA involving the distal interphalangeal joint.[28] Additionally, imaging studies have also detected subclinical inflammation of the entheses in clinically normal joints in patients with undiagnosed PsA.[26] The Koebner phenomenon may explain the occurrence of these changes, which result from aberrant activation of the immune system in response to mechanical stress. Interestingly, unlike the skin, the major key player in the inflammatory process is the innate immune system, with an autoinflammatory reaction being triggered by mechanical stress.[20,26] Investigators evaluated patients with PsA with and without clinical onychopathy and reported that almost all of them had nail psoriasis demonstrated by magnetic resonance imaging.[29] Similarly, distal phalanx involvement was also present in all patients with magnetic resonance imaging nail changes.[29] This suggests that nail dystrophy may be a marker of persistent inflammation of the distal phalanx.[27] Cutaneous involvement precedes articular disease in 75% to 80% of patients; therefore, nail psoriasis is a predictor for development of enthesitis and PsA.[20,26] Early detection of joint inflammation is essential to prevent bone damage and irreversible joint deformity.

We found that nail psoriasis was associated with greater disease severity and disease duration, in accordance with other studies.[3,13,16,17] We demonstrated that nail psoriasis was associated with metabolic syndrome and major adverse cardiovascular events. Trials have proven that psoriasis is an independent risk factor for metabolic syndrome and major adverse cardiovascular events, and the risk is higher with more severe disease and longer duration of psoriasis.[30] We observed that a higher body mass index was associated with nail psoriasis, which was also described by Spanish investigators.[17] Notably, nail psoriasis is indirectly associated with metabolic complications because nail psoriasis is more prevalent among patients with more severe psoriasis and longer duration of disease.[30] A study in Spain reported a higher proportion of patients with nail psoriasis had metabolic syndrome; however, the difference between those with or without nail psoriasis was not significant.[17] A recent investigation found that isolated nail psoriasis was not associated with an increased risk of metabolic syndrome.[4] Nevertheless, patients with isolated nail psoriasis should still undergo screening for metabolic syndrome depending on the risk assessment of their cardiovascular comorbidities.

A study conducted in Turkey[31] on the association of smoking with nail psoriasis concurred with our findings and demonstrated that smoking was associated with higher psoriasis area severity index scores and higher systemic treatment requirements. Reactive oxygen species lead to oxidative damage and activation of proinflammatory transcription factors, which trigger systemic inflammation.[31]

A trial in Germany[3] concurred with our outcome of poorer QOL in psoriasis patients with nail involvement than in those without nail involvement. The burden of nail psoriasis is multifactorial,[15] ranging from poor cosmesis, functional impairment, restriction of activities, and psychologic comorbidities. Patients with nail psoriasis have altered touch sensation and difficulties with fine motor skills.[2,11] Many patients have reported pain, leading to difficulties in performing daily activities and impaired QOL.[3,24] As nail psoriasis is not cosmetically pleasing, this may result in stigmatization and poor self-image.[13,25] Severe nail psoriasis has also been associated with higher anxiety and depression scores.[25] Furthermore, patients with nail psoriasis have reported a higher number of absenteeism from work in the past 12 months and a 2.5-fold increased risk of requiring inpatient treatments over 5 years.[3] Patients with nail psoriasis were less satisfied with their treatment and regarded the treatment as a burden.[3]

Treatment of nail psoriasis is challenging. Topical treatments are used, but treatment response remains poor due to limited drug penetration through the nail plate[32] and the need for prolonged treatment due to slow response. Treatment needs to be tailored to the site of nail involvement, ie, nail matrix, nail bed, or both, as treatment response differs according to the site.[32] The findings of this study showed that patients with nail involvement were more likely to require systemic treatment because they had more severe disease and poorer QOL. A consensus by nail experts has recommended the use of intralesional corticosteroids for matrix involvement alone and topical steroid alone or in combination with topical calcipotriol for nail bed involvement alone, if $\leq$3 nails are affected. Those with more severe involvement should be managed with systemic treatment such as methotrexate, acitretin, cyclosporine, biologics or small molecules.[32,33] Recent literature has reported that treatment with biologic agents and small molecules are associated with rapid and significant improvement with sustained response.[2,6,33]

Limitations and recommendations

A longitudinal study is preferred to assess disease progression, comorbidities, and response to treatment. The prevalence of nail psoriasis may be underrepresented as pa-

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tients with mild psoriasis are managed by primary care doctors. The majority of the dermatologists in the private setting did not participate in the registry data collection. In addition, patients with mild psoriasis were only notified at the first visit, and those who developed nail psoriasis subsequently were not captured in this registry. On the other hand, this potential underrepresentation may be counterbalanced by cases of onychomycosis that have been misdiagnosed as nail psoriasis. As this study relies on registry data, the information gathered regarding nail psoriasis was not comprehensive. We were only able to report on the common observable features. Because the patients were mainly recruited from tertiary referral clinics, about two-thirds of the patients had moderate to severe psoriasis, which is much higher than in population-based studies. The temporal relationship between psoriasis, PsA, and nail involvement could not be determined. Nail psoriasis severity with objective scoring such as the nail psoriasis severity index was not included in the registry. Thus, we were not able to evaluate the effectiveness of the prescribed treatment because information regarding the severity of nail disease before and after treatment was not available.

Moving forward, we propose a future study that mandates reporting from all clinics and hospitals in Malaysia. This study should emphasize comprehensive documentation of nail changes and severity, as this is a crucial step to acquire robust and reliable data.

Conclusions

The prevalence of nail psoriasis among Malaysian patients with psoriasis was 54.2%. Nail psoriasis was associated with a longer duration of psoriasis, older age of onset, male sex, and family history of psoriasis. Special attention should be given to nail psoriasis as it is associated with PsA, more severe disease, involvement of face and scalp, increased cardiometabolic risk, and greater impairment of QOL.

Declaration of competing interest

The authors declare no conflicts of interest.

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