Keywords: Nail psoriasis, psoriatic nail disease, psoriatic arthropathy

1 Introduction

The classification criteria for Psoriatic Arthritis (CASPAR) was first proposed in 2006 and then developed as an internationally agreed criterion for diagnosing Psoriatic Arthropathy (PsA) [1,2]. It demonstrated 98.2% sensitivity and 99.5% specificity in detecting PsA in the Chinese population [2].

Psoriatic nail dystrophy is one of the main components within CASPAR criterion; however, the knowledge and information concerning nail psoriasis is extremely lacking, particularly in Hong Kong [1]. Worldwide, the reported prevalence of nail involvement in PsA varied widely from 30.2% to 97% [3,4]. Nail psoriasis has many clinical signs, such as, pitting, hyperkeratosis and crumbling, etc. and each sign may have different clinical implications on the pathogenesis of arthritis. A study by Kane et al. described that nail dystrophy was significantly more prevalent in PsA patients with distal interphalangeal joint arthritis than those without [5]. Moreover, nail psoriasis itself can adversely affect the patient’s quality of life and hence, leads to significant functional impairment and pain. Despite the reported correlations associated with psoriatic nail disease, nail psoriasis recognition is always underemphasized in rheumatologist’s daily practice.

The primary objective of this study was to investigate the prevalence of psoriatic nail manifestations and to understand their pattern in the Hong Kong Chinese PsA population. The secondary objective was to investigate the associated factor for them, in the hope of raising the rheumatologists’ awareness of this commonly encountered phenomenon.
2 Methodology

2.1 Study Design

This research was a single-centered, cross-sectional observational study. The project was reviewed and approved by the local Clinical Research Ethics Committee.

2.2 Inclusion Criteria

From January to November 2016, subjects with PsA attending the rheumatology clinic of Tseung Kwan O Hospital were consecutively recruited with written consent. They had to (1) be at least 18 years or above, and (2) have fulfilled the CASPAR criteria of PsA [1,2].

2.3 Exclusion Criteria

Subjects who (1) were not Chinese ethnicity, (2) had their hand amputated, and (3) those under treatment for nail onychomycosis, were excluded.

2.4 Demographics and Related Parameters

Demographic data and disease related parameters, which included age, sex, body mass index, family history, age of onset and disease duration of skin psoriasis and PsA, were recorded.

Based on the patients’ history, physical and radiographical findings, PsA was categorized into five subclasses: (1) oligoarthritis (<5 joints involvement), (2) polyarthritis (≥ 5 joints involvement), (3) predominant distal interphalangeal joints involvement, (4) predominant axial involvement and (5) arthritis mutilans [2,4].

2.5 Disease Activity Measurement

68 tender joint-count and 66 swollen joint-count were employed to estimate the disease activity in PsA patients [6]. Psoriatic skin lesions were also examined and were assessed by means of Psoriasis Area and Severity Index (PASI) and Body Surface Area (BSA) [6]. Severe skin involvement was defined as those with PASI or BSA greater than 10 [7].

As a part of the assessment of PsA disease activity, blood tests including the C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR) were performed within 4 weeks of the investigation.

2.6 Identification of Psoriatic Nail Disease

Patients’ fingernails were assessed by the presence of nail pitting, crumbling, onycholysis, splinter hemorrhage, red spot lunula, hyperkeratosis, leukonychia and oil drop sign and scored by the modified Nail Psoriasis Severity Index (mNAPSI). Higher scores represent worse nail disease, ranging from 0-14 per nail and 0-140 for 10 fingernails [6,8]. The nail characteristics were also documented.

2.7 Statistical Analysis

The data obtained was analyzed by using SPSS 17.0 Apple OS. The frequency of nail psoriasis was determined by calculating the percentage of patients showing nail characteristic of PsA, in any digit. All clinical and related parameters were expressed as percentages and mean (+-SD).

Basic demographics and clinical variables were compared between two groups (subjects with or without nail psoriasis), by using Student T-test or Mann-Whitney U test as appropriate, whilst Chi-square test was used to compare categorical variables and to look for associated factors for positive nail psoriasis. Statistical significance was defined as a p-value of less than 0.05, two tailed.

3 Results

3.1 Patients’ Characteristics

Finally, a total of 106 PsA eligible participants joined the project. There were 65 males and 41 females, with a mean age of 52.1 +/- 11.5 years. The mean age of onset of skin psoriasis and PsA were 37.5 +/- 13.8 and 44.6 +/- 12.1 years respectively. The mean duration of skin psoriasis and PsA were 14.5 +/- 10.6 and 7.5 +/- 7.2 years respectively. A positive family history of skin psoriasis was reported in 14.2% of the patients but only two patients (1.9%) reported family history of PsA.

Oligo-articular (34%) and poly-articular arthritis (34%) were the most common arthritis subclasses in the 106 studied patients, followed by predominant axial spondylitis (18.9%), predominant distal interphalangeal (DIP) joint arthritis (11.3%), and arthritis mutilans (1.9%). Among all these patients, the mean tender-joint count was 1.6 +/- 2.8, while the swollen-joint count was 2.3 +/- 4.2.
The mean ESR level was 35.8 +/- 27.2 mm/hr, and the CRP level was 10.2 +/- 13.2 mg/dL. At the time of examination, their mean skin PASI score (0-72) was 4.5 +/- 6.8 and the mean body surface area (0-100%) involved was 7.0 +/- 16.3. Table 1 summarizes the demographics and characteristics of all PsA participants (n=106).

### 3.2 Frequency of Psoriatic Nail Disease and Pattern

Psoriatic nail changes were recognized in 65 (61.3%) of the 106 patients with the mean mNAPSI of 9.5 +/- 15.2, in all participants.

Among those with nail involvement, the mean mNAPSI was 15.3 +/- 16.9 and 72.3% of them were noted to have pitting, 50.8% had onycholysis, 26.2% had crumbling, followed by leukonychia (10.8%), subungual hyperkeratosis (6.2%), red spot lunula (1.5%), oil drop sign (1.5%) and splinter hemorrhage (0%). Table 2 summarizes their psoriatic nail features.

### 3.3 Psoriatic Nail Disease and Associated Factors

Clinical variables between those with and without nail psoriasis were compared. 65 PsA patients had nail involvement, while 41 did not.

On univariate analysis, the sole factor associated with psoriatic nail disease was the presence of severe skin condition (PASI/BSA >10) with a p-value of 0.04.

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**Table 1.** Demographics and characteristics of PsA patients (n=106).

<table>
<thead>
<tr>
<th></th>
<th>Number (%)</th>
<th>Mean (+/- SD)</th>
</tr>
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<tbody>
<tr>
<td><strong>M/F ratio</strong></td>
<td>65/41 (61.3/38.7)</td>
<td></td>
</tr>
<tr>
<td><strong>Age (years)</strong></td>
<td></td>
<td>52.1 +/- 11.5</td>
</tr>
<tr>
<td><strong>Body mass index (kg/m2)</strong></td>
<td></td>
<td>24.9 +/- 3.7</td>
</tr>
<tr>
<td><strong>Family history of psoriasis</strong></td>
<td>15 (14.2)</td>
<td></td>
</tr>
<tr>
<td><strong>Family history of PsA</strong></td>
<td>2 (1.9)</td>
<td></td>
</tr>
<tr>
<td><strong>Disease onset and duration</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Age at onset of psoriasis (years)</strong></td>
<td>37.5 +/- 13.8</td>
<td></td>
</tr>
<tr>
<td><strong>Age at onset of PsA (years)</strong></td>
<td>44.6 +/- 12.1</td>
<td></td>
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<tr>
<td><strong>Duration of psoriasis (years)</strong></td>
<td>14.5 +/- 10.6</td>
<td></td>
</tr>
<tr>
<td><strong>Duration of arthropathy (years)</strong></td>
<td>7.5 +/- 7.2</td>
<td></td>
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<tr>
<td><strong>Disease activity</strong></td>
<td></td>
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<tr>
<td><strong>Swollen joint count (0-66)</strong></td>
<td>2.3 +/- 4.2</td>
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<tr>
<td><strong>Tender joint count (0-68)</strong></td>
<td>1.6 +/- 2.8</td>
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<tr>
<td><strong>ESR (mm/hr)</strong></td>
<td></td>
<td>35.8 +/- 27.2</td>
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<tr>
<td><strong>CRP (mg/dL)</strong></td>
<td></td>
<td>8.8 +/- 9.6</td>
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<tr>
<td><strong>Arthritis subclass</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oligoarticular</td>
<td>36 (34.0)</td>
<td></td>
</tr>
<tr>
<td>Polyarticular</td>
<td>36 (34.0)</td>
<td></td>
</tr>
<tr>
<td>Axial spondylitis</td>
<td>20 (18.9)</td>
<td></td>
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<tr>
<td>Distal interphalangeal joint arthritis</td>
<td>12 (11.3)</td>
<td></td>
</tr>
<tr>
<td>Arthritis mutilans</td>
<td>2 (1.9)</td>
<td></td>
</tr>
<tr>
<td><strong>Skin</strong></td>
<td></td>
<td></td>
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<tr>
<td><strong>PASI score (0-72)</strong></td>
<td></td>
<td>4.5 +/- 6.8</td>
</tr>
<tr>
<td><strong>Body surface area (0-100%)</strong></td>
<td>7.0 +/- 16.3</td>
<td></td>
</tr>
<tr>
<td><strong>Severe condition (PASI/BSA&gt;10)</strong></td>
<td>14 (13.2)</td>
<td></td>
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</table>
but there was no linear relationship found between the values of mNAPSI and PASI (p=0.13), as well as mNAPSI and BSA (p=0.12). And there was no association between ESR, CRP, arthritis subclass, disease duration of skin psoriasis or arthropathy, and positive nail psoriasis. Table 3 summarizes the potential associated factors for psoriatic nail disease.

4 Discussion

The present study found that psoriatic nail disease occurred commonly in PsA patients, with a frequency of 61.3%. The most common nail psoriasis subtypes found were pitting, onycholysis and crumbling. The presence of psoriatic nail disease was significantly associated with skin extent and severity, but not correlated with skin or arthropathy duration, arthritis subclass and inflammatory markers, including ESR and CRP.

Despite the fact that nail psoriasis is a common manifestation in PsA, the data regarding its prevalence is scarce, and majority of information is confined to the Western countries [3,7,9]. A study by Klassen et al. had a sample size of 1,459 psoriasis patients, the percentage of those with nail changes was 66.0% and a recent survey by Love et al. found nail involvement in 54% of 183 PsA patients [3,9]. In Asia, Leung YY et al. demonstrated that positive nail findings were present in 74.2% of 127 Chinese PsA patients, but it was a pity that the nail pattern and associated factors were not well-described [4]. Our analysis also revealed high prevalence of nail disease, even though our sample size was smaller (n=106). Both research and the collected data highlighted how common the psoriatic nail condition in PsA patients was, irrespective of the ethnic origins [3,4,9].

Our findings also discovered that nail involvement was more common in patients with substantial skin extent and severity; it is logical to have this outcome, since nail is an appendage of the skin. Armesto et al. demonstrated that PsA patients with nail dystrophy had longer disease duration, in addition to having more severe skin problem [10]. There was no correlation found between nail problem and disease duration in the current study, discrepancy between our results could be due to our relatively small sample size (106 vs 661 subjects) [10].

Although the current study supported that nail psoriasis was more prevalent in those with severe skin extent (PASI/BSA >10), but it did not reveal any relationship between the severity of nail dystrophy (mNAPSI) and skin involvement (PASI or BSA). The nail dystrophy severity in PsA was disproportional to skin problem, it can be explained by the fact that skin and nail-plate grew at different rates [11]. On an average, it takes about 3 months for a fingernail to grow from base to tip, and about 4 weeks for the skin to grow from base to top [11]. Thus, PsA disease expresses invariably in different parts of the body; even skin and nail belong to the same organ system [11].

There are other reasons that rheumatologists should understand more about psoriatic nail phenomenon, notwithstanding its common prevalence [3,4]. Nail
psoriasis can be the first sign of PsA, in the absence of skin or joint involvement though it is uncommon. From our present data, only 5 (4.7%) of 106 studied patients were found to have nail psoriatic features yet, but without cutaneous manifestation. In recent decade, several researches pinpointed that psoriatic nail disease might be an indicator of future psoriatic joint damage, and specific nail subtype might have clinical implications in the development of arthritis [12,13]. A 2010 study revealed that a specific nail subtype –onycholysis – was strongly associated with small joint involvement, with an odds ratio of 3.42 [3]. Another trial performed in our locality also demonstrated that nail crumbling and onycholysis had a strong link with distal interphalangeal joint arthritis in individual digit [14]. Their close relationship might be explained by their intimate anatomical relationship in the digit [15-17]. By using MRI imaging, Tan AL et al. showed the migration of inflammation cells from the nail plate and moved proximally to the adjacent DIP joint in PsA patients, and causing joint destruction [15]. However, the underlying pathophysiology of how one specific nail subtype is more strongly related with arthritis is poorly understood. It is imperative to have more research performed to explore their genuine relationship.

4.1 Study Limitations

There are some limitations in this study that warrant discussion. First, neither the treatment for PsA nor nail psoriasis was recorded. Although fingernails grow slowly but their appearance can still be affected if prior treatments are given, such as, methotrexate, retinoid and cyclosporine, etc.

Secondly, the dactylitis and enthesitis modalities were not considered in the current study. Both parameters are cardinal features of PsA, in which their presence and severity may be associated with psoriatic nail changes [1,6]. In fact, a previous experiment demonstrated that the enthesis and psoriasis nail-fold capillaries presented
similar vascular damages morphologically [18]. The presence of active enthesitis probably can cause nail-matrix inflammation, and leads to nail dystrophy [15,18].

Finally, the sample size was relatively small when compared with the other studies. In a study by Leung YY et al., a total of 127 Chinese PsA subjects participated in the survey, but the nail conditions were not well defined [4]. Hopefully, more large-scale studies will be conducted in the future, to understand more about this common encountered feature.

5 Conclusion

We found a high rate of psoriatic nail disease in the Hong Kong Chinese patients with psoriatic arthropathy, and it was closely associated with extensive skin problems. Common nail features encountered including pitting, crumbling and onycholysis. The presence of nail disease was not related to arthritis subclasses, disease duration and inflammatory markers.

Since certain psoriatic nail features might be associated with arthritis development and future joint damage, nails in PsA patients should not be overlooked in our daily practice. Hopefully, this survey can raise the rheumatologists' awareness of this common manifestation among PsA patients in our locality.

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References


