The link between psoriatic arthritis comorbidity index and clinical characteristics in patients with psoriatic arthritis

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Abstract

Objectives: Psoriatic arthritis comorbidity index (PsACI) was developed specifically to assess comorbidity in psoriatic arthritis (PsA) patients. This study aimed to investigate the association between PsaCI and clinical characteristics in patients with PsA
Methods: This is a cross sectional study including PsA patients who visited the Rheumatology Clinic at Hospital Raja Permaisuri Bainun. Their clinical characteristics and comorbidities were recorded.
Results: This study population consisted of 172 patients with PsA. There were 77 males (44.8%) and 95 females (55.2%). Hypertension (59.9%) was the most common comorbidity, followed by dyslipidemia (46.5%) and diabetes mellitus (36.1%). The PsACI score was significantly associated with age and obesity ($p<0.001$). Further analysis revealed that both the age of onset for psoriasis and the age of onset for PsA exceeding 45 years were positively correlated with higher PsACI scores. PsACI did not correlate with the multiple domains of PsA, the site of psoriasis or treatment regimen given.
Conclusions: The findings underscore the critical importance of managing comorbid conditions in PsA patients, especially among those with an earlier age of psoriasis onset, older patients with PsA, and those with obesity. The results showed the overall comorbidity burden may be influenced more by patient-specific factors rather than disease-specific factors. Further research is needed to better understand the interplay between comorbidities and PsA.

Key words: clinical characteristics; comorbids; obesity; Psoriatic arthritis comorbidity index; Psoriatic arthritis

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Introduction

Psoriatic arthritis (PsA) is recognized as a highly heterogeneous disease, characterized by various articular phenotypes and extra-articular manifestations.[1] Its prevalence in the general population ranges from 0.3% to 1%.[2] PsA is further linked to numerous comorbid conditions, encompassing cardiovascular comorbidities, depression, diabetes, obesity and osteoporosis.[3-7] Indeed, PsA patients exhibit a higher prevalence of metabolic syndrome compared to individuals with Rheumatoid Arthritis (RA) or Ankylosing Spondylitis (AS).[8]

In terms of measuring and assessing multimorbidity, several instruments have been developed, primarily tested in RA. These instruments include Functional Comorbidity Index (FCI), Charlson Comorbidity Index (CCI) and Rheumatic Disease Comorbidity Index (RDCI). Although these instruments have been utilized predominantly in RA, there have been limited reports of their use in Psoriatic Arthritis (PsA) as well. Recently validated psoriatic arthritis comorbidity index (PsACI) was developed specifically to assess comorbidity in PsA patients.[9] However, the association between comorbids and the disease characteristics of PsA is not well understood. This study aimed to investigate the association between PsaCI and clinical characteristics in patients with PsA.

Material and Methods

We conducted a cross sectional study including PsA patients who visited the Rheumatology Clinic at Hospital Raja Permaisuri Bainun from 1971 til 2022. Our local ethics committee has approved the research protocol (NMRR ID-22-00629-3LK). For this study, analyses were restricted to patients fulfilling the ClASsification for Psoriatic ARthritis (CASPAR) criteria for PsA.[10]

Variables were collected from the patients' medical and clinical records, including ethnicity, gender, age of onset of PsA, different type of Psoriasis and PsA, extra-articular features, lifestyle factors, body mass index (BMI) and treatment history. Obesity was defined as BMI of more than 30.
Comorbidities were assessed using the PsACI, a validated method for quantifying comorbidities in PsA. This index consists of 29 comorbidities, including metabolic syndrome, ischemic heart disease, myocardial infarction, hypertension, diabetes mellitus, smoking, and anxiety, among others. Each comorbidity is assigned a score ranging from 0.5 to 5 based on its severity. The total PsACI score ranges from 0 to 37, with higher scores indicating a greater burden of comorbidities.

Statistical analysis: We used Statistical Package of Social Sciences (SPSS) software version 28.0 for data analysis. The Mann-Whitney U test / Wilcoxon rank-sum test and Kruskal-Wallis were used to compare mean differences between two independent samples and more than two independent samples, respectively. We looked for the association between PsaCI and PsA patient's clinical characteristics.

Results

This study population consisted of 172 patients with PsA. There were 77 males (44.8%) and 95 females (55.2%), resulting in a male-to-female ratio of 0.81:1. Among these patients, 74 (43%) were aged 60 years and above. In terms of ethnicity, 63 patients were Malay and Indian, while 46 were Chinese. Obesity was present in 52 (30.2%) of the PsA patients and it was positively correlated with PsACI.

Regarding the types of PsA, peripheral arthritis was present in 165 of all PsA patients, with 17 having both axial and peripheral arthritis involvement. Enthesitis and dactylitis were present in 46 and 24 of the PsA patients, respectively. In terms of therapy regimens, 72 patients received at least two conventional disease-modifying antirheumatic drugs (DMARDs), and no correlation was noted with PsACI. (Table 1)

One or more comorbidities were noted in 146 (84%) PsA patients. Hypertension (59.9%) was the most common comorbidity, followed by dyslipidemia (46.5%) and diabetes mellitus (36.1%). The

presence of these comorbidities significantly increased in patients age and positively correlated with PsACI($p<0.001$). There was positive correlation of PsACI with age of onset 45 years or over for psoriatic arthritis. (Table 1)

On multivariable analysis, the age of diagnosis for psoriasis were found to be associated with PsACI while no associations were noted in domains of PsA or site of psoriasis. (Table 2)

Table 1 Relation between PsACI and the main disease characteristics

Characteristics	Number (n=172)	Mean PsACI(SD)	95% CI		p-value
			LL	UL	
Gender					
Male	77	4.558 (±3.151)	2.719	3.745	0.5379
Female	95	4.800 (±3.030)	2.652	3.535	
Age (y)					
< 40	19	1.947 (±2.677)	2.022	3.958	<0.01
40-59	79	4.665 (± 3.317)	2.869	3.934	
60 and above	74	5.426 (±2.482)	2.137	2.962	
Patient aged 60 y or over					
Yes	70	5.493(±2.463)	2.114	2.958	0.002
No	102	4.142 (±3.338)	2.934	3.871	
Age at onset PsA over 45 y					
Yes	102	5.598 (±2.685)	2.360	3.114	<0.01
No	70	3.371 (±3.154)	2.704	3.784	
PsA duration of ≥ 5 y					
Yes	140	4.871 (±3.026)	2.709	3.429	0.1015
No	32	3.906 (±3.226)	2.587	4.290	
Ethnicity					
Malay	63	4.119 (±3.196)	2.719	3.877	0.052
Chinese	46	4.500 (± 2.957)	2.453	3.725.	
Indian	63	5.405 (± 2.948)	2.508	3.574	
BMI categories					
Non-obese	120	3.954 (±2.645)	2.348	3.030	<0.01
Obese	52	6.394(± 3.347)	2.805	4.150	
Smokers					
Non-smoker	76	4.421 (±3.278)	2.827	3.902	0.258
Ever smoke	96	4.906 (± 2.909)	2.548	3.391	
ESR (mm/1st hr)	-	-	-	-	0.716
Domains of PsA					
Axial	17	4.059 (±3.172)	3.362	4.827	0.356
Oligoarticular	62	4.911 (±3.274)	2.782	3.978	0.529
Polyarticular	64	4.414 (±2.863)	2.438	3.467	0.407
Dactylitis	24	4.896 (±3.128)	2.431	4.387	0.678
Enthesitis	46	4.870 (±3.081)	2.556	3.881	0.633
Nail dystrophy	75	4.547 (±3.185)	2.744	3.796	0.559
Site of psoriasis					
Scalp	57	5.018 (±3.159)	2.667	3.876	0.328
Face	22	4.091 (±2.860)	2.201	4.088	0.370
Trunk	42	4.500 (±3.086)	2.539	3.935	0.684
Genital	7	4.286 (±3.592)	2.315	7.911	0.677
Gluteal cleft	3	2.000 (±2.646)	1.377	16.628	0.110
Treatment					
b DMARDs	23	5.000 (±3.330)	2.576	4.714	0.650
cs DMARDs	162	4.759 (±3.066)	2.764	3.441	0.243
≥ 2 csDMARDs	72	5.069 (±3.127)	2.686	3.741	0.156

y, years; ESR, erythrocyte sedimentation rate; PsaCI, The Psoriatic Arthritis Comorbidities Index; PsA, Psoriatic arthritis; bDMARDs, biologic disease modifying antirheumatic drugs; csDMARDs, conventional synthetic disease modifying antirheumatic drugs

Table 2 The comorbidities according to PsACI in PsA patients

Comorbidities (%)	PsA patient (n=172)
Metabolic Syndrome	33 (19.1)
Myocardial Infarction	2(o.01)
Ischemic Heart Disease	20 (11.6)
Diabetes Mellitus	62 (36.0)
Depression	1 (0.01)
Fracture	1(0.01)
Hypertension	103 (59.9)
Arrhythmia	0 (0)
Cerebrovascular Disease	3 (1.74)
Peripheral Vascular Disease	0(0)
Fall	1 (0.01)
Liver Disease	74 (43)
Pulmonary Disease	2 (0.01)
Endocrine	6 (3.49)
Gastrointestinal	3 (1.74)
Renal	4 (2.32)
Tumour	6(3.48)
Infection	3(1.74)
Anxiety	0 (0)
Smoking	96 (55.8)
Osteoporosis	7(4.07)
Periodonititis	0 (0)
Osteoarthritis	8(4.65)
Eye Inflammation/Uveitis	2(0.01)
Vasculitis	0 (0)
Amyloidosis	0 (0)

PsaCI, The Psoriatic Arthritis Comorbidities Index; PsA, Psoriatic Arthritis

Table 3 Data from multivariable analysis

	B	t	P value	95% confidence interval	
				Inferior	superior
Age of diagnosis					
Psoriasis	0.0920	4.68	0.001	0.0531	0.131
PsA	0.0367	1.24	0.218	-0.219	0.095
Disease duration					
Psoriasis	0.0553	0.0306	1.80	-0.0053	0.116
PsA	0.0217	0.46	0.644	-0.071	0.114
Types of PsA					
Peripheral arthritis	0.767	0.61	0.545	-1.728	3.261
Axial	-0.665	-0.83	0.407	-2.247	0.916
Oligoarticular	-0.039	-0.06	0.950	-1.291	1.211
Polyarticular	-0.577	-0.90	0.367	-1.838	0.683
Dactylitis	0.252	0.722	0.722	-1.143	1.645
Enthesitis	0.277	0.614	0.614	-0.807	1.361
Nail dystrophy	-0.355	0.478	0.478	-1.342	0.631
Site of psoriasis					
Scalp	0.799	1.46	0.146	-0.277	1.856
Face	-0.814	-1.05	0.297	-2.349	0.721
Trunk	-0.095	-0.16	0.872	-1.252	1.062
Genital	0.458	0.36	0.721	-2.063	2.977
Gluteal cleft	-2.550	-1.39	0.167	-6.174	1.076

PsA , psoriatic arthritis

Discussion

It's notable that about half of our PsA patients have hypertension and dyslipidemia, with a prevalence of ischemic heart disease around 10%. These findings, while comparable to data from American cohorts, exhibit lower rates in European countries.[11, 12] This discrepancy could potentially be explained by the diversity of genetic backgrounds across different populations, highlighting the influence of genetic factors on the prevalence of cardiovascular risk factors in PsA patients.

This high prevalence of comorbidities was demonstrated in another study, which indicated that up to 40% of PsA patients have more than three comorbidities as showed in our study.[13] Indeed, there is a higher prevalence of cardiovascular risk comorbidities including hypertension, dyslipidemia, type 2 diabetes mellitus, and obesity, among patients with psoriasis who also have PsA, compared to those with psoriasis alone and the general population[14,15].

Our study showed that PsACI was positively correlated with age and significantly increased in those aged 60 and above. We demonstrated that PsACI was correlated with the age of diagnosis of psoriasis and PsACI was higher in those age at PsA onset exceeds 45 years. Studies have shown that patients with PsA suffer from comorbidities at a younger age than expected, and the prevalence of comorbidities also increases with age.[16] One plausible explanation is the link between psoriasis and metabolic abnormalities like hyperlipidemia, which in turn, elevate the risk of atherosclerosis.[17] Chronic systemic inflammation associated with both psoriasis and PsA contributes to the development and progression of cardiovascular disease by promoting atherosclerosis, thus increasing the overall comorbidity burden among PsA patients.[18]

Nearly 30% of our cohort were obese, a finding that is consistent with PsA cohorts worldwide. Studies have indicated a link between obesity and PsA severity, with obese PsA patients demonstrating a lesser response to treatment compared to those with normal weight.[19,20,21] Our study found that PsACI was significantly higher in obese patients. This could be explained by the fact that obesity is associated with hypertension, diabetes mellitus, and dyslipidemia, all of which are closely linked to the development of cardiovascular disease.[22]

This study demonstrated no association between the PsACI and the multiple domains of PsA. Similarly, there was no link between the site of psoriasis or the treatment given and PsACI. This indicates that comorbidities in PsA patients, as measured by PsACI, do not appear to be influenced by the specific clinical manifestations of PsA, the location of psoriasis, or the type of treatment administered. This underscores the importance of independently monitoring and managing comorbidities in PsA patients, regardless of their specific disease characteristics or treatment regimen. In the latest 2023 European League Against Rheumatism (EULAR) recommendations for the management of psoriatic arthritis, emphasis has been placed on the importance of considering comorbidities such as obesity, metabolic syndrome, cardiovascular disease, or depression when managing patients with PsA.[23] As current cardiovascular risk calculators such as the Framingham score and Systematic Coronary Risk Evaluation do not adequately account for the role of inflammation, EULAR has suggested multiplying the risk calculated by these calculators by a factor of 1.5 for rheumatic diseases like PsA. This adjustment aims to better estimate the cardiovascular risk in patients with inflammatory conditions.[24,25,26]

PsACI is a validated specific tool for classifying prognostic comorbidity in patients with PsA. This comorbidity score offers the advantage of consolidating all comorbidities into a single score based on their severity, facilitating comparisons between PsA patients and enabling a comprehensive assessment of their prognostic risk.[27] CCI was developed to predict the 10-year survival rate based on a sample of hospitalized patients, which was not specific to rheumatic diseases. Similarly, the RDC is a self-report questionnaire specifically designed for RA patients but did not include PsA patients in its development. Therefore, both the CCI and RDCI are not ideal for quantifying comorbidities in PsA compare to PsaCI.[28,29]

The main limitation of this study was that it was from a single rheumatology center. Additionally, the erythrocyte sedimentation rate (ESR) was used as the inflammatory marker to monitor disease activity instead of C-reactive protein (CRP) because ESR is more readily available in our center. CRP

levels are associated with the risk for cardiovascular disease, diabetes, metabolic syndrome, and are also incorporated into composite indices of PsA activity, such as Disease Activity in Psoriatic Arthritis (DAPSA)[30,31]. To our knowledge, this is the first study to investigate the association between PsACI and clinical characteristics in patients with PsA.

Conclusion

The findings underscore the critical importance of managing comorbid conditions in PsA patients, especially among those with an earlier age of psoriasis onset, older patients with PsA, and those with obesity. The positive correlation between the age of onset of psoriasis and PsACI highlights the potential impact of early disease onset on the overall burden of comorbidities. However, the lack of correlation between PsACI and the specific domains of PsA, the site of psoriasis, or treatment regimens suggests that the overall comorbidity burden may be influenced more by patient-specific factors rather than disease-specific factors. Further research is needed to better understand the interplay between comorbidities and PsA, and to develop strategies for effective management of these comorbidities in PsA patients.

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