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Burden of enthesitis on the quality of life and work productivity in psoriatic arthritis patients

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Abstract

Background: Psoriatic arthritis (PsA) which affects 6–42% of psoriasis patients is the most common extra-cutaneous manifestation of the psoriasis disease. Enthesitis may be considered as a sign of increased disease burden due to its association with several clinical aspects. Therefore, the aim of the study was to investigate the effect of clinical enthesitis on quality of life and work productivity in PsA patients.

Results: Enthesitis was detected in 50% of patients. There was statistically significant difference between the studied groups as regard disease activity index for psoriatic arthritis (DAPSA) score, psoriatic arthritis impact of the disease 12 (PsAID-12), Health Assessment Questionnaire disability index (HAQ-DI), and Spondyloarthritis Research Consortium of Canada index (SPARCC) with higher mean score in patients with enthesitis. The majority of patients with enthesitis had a higher percentage of impairment in daily activities (95.5%) than those without enthesitis (38.6%), as well as a statistically significant positive correlation between SPARCC index and both work absenteeism and work productivity loss. Furthermore, enthesitis in both the upper and lower sites was related with worse quality of life (36.4%) and higher work impairment (45.5%) compared to patients with enthesitis in either the upper or lower sites alone.

Conclusion: Enthesitis was a frequent complaint among PsA patients. PsA patients with enthesitis had a significant disease burden regardless of enthesitis location, and patients with enthesitis in both the upper and lower sites have a worse quality of life and a higher work impairment.

Background

Psoriatic arthritis (PsA) is a chronic inflammatory disease that affects up to 1% of the population [1]. It is a complex disease involving musculoskeletal disorders (related to the spine, enthesis, and peripheral joints) as well as extraarticular extra-cutaneous manifestations such as gastrointestinal and eye manifestations [2]. PsA, which affects 6–42% of psoriasis patients, is the most common extracutaneous manifestation of the disease [3].

Enthesitis, defined as the inflammation of the junction where the tendon, ligament, or joint capsule inserts

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into the bone [4], has been related to axial and peripheral joint damage, an increased risk of developing joint ankyloses, overall higher disease activity, lower quality of life (QOL) and functional status, sleep disruption, and patient-reported pain and fatigue in PsA patients [5]. As a result, it may be considered as a sign of increased disease burden due to its association with several clinical aspects [6, 7].

Among patients with PsA, enthesitis is known to be resistant to disease-modifying antirheumatic drugs (DMARDs), and it often requires intensive treatment [6]. Therefore, in the present study, we investigated the effect of clinical enthesitis on QOL and work productivity in PsA patients as the impact of the disease's skin and joint components on QOL and work productivity has



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previously been studied, but the impact of enthesitis in PsA has been poorly investigated.

Patients and method

This study is a single-center cross-sectional study that included eighty-eight consecutive patients with PsA recruited from the outpatient clinics of rheumatology and rehabilitation and dermatology departments at the university hospital. The study was approved from the university's local ethical committee and was registered with the following number: ZU-IRP-#9018. Before participation in the study, each patient completed written informed consent.

Inclusion criteria

The patients were included if they were diagnosed with PsA based on the ClASsification criteria for Psoriatic Arthritis (CASPAR) [8].

Exclusion criteria

Patients were excluded if they had another rheumatic disease or any other form of spondyloarthropathy or any disability not related to the disease under the study or associated with coexisting comorbid conditions.

All patient information was collected from medical records with a focus on demographics. This data comprised patient demographics and clinical characteristics (such as the presence and severity of enthesitis, the severity of PsA disease overall, other PsA symptoms encountered, and the patient's current therapy), and was recorded into a special data file. Erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), and rheumatoid factor (RF) were also measured in the laboratory.

Grouping

The recruited patients were further categorized into two groups according to the presence of enthesitis as the following: group 1, included patients with enthesitis (n = 44), and group 2, included patients without enthesitis (n = 44) as shown in the flowchart (Fig. 1).

Measures

- Disease activity: Patients were evaluated by using the disease activity in psoriatic arthritis (DAPSA) score. It consists of five untransformed, unweighted variables, including a laboratory variable (CRP in mg/dL), two patient-centered items (patient global assessment; PtGA and pain on an 11-point numeric rating scale; NRS), one physician-centered item (66-swollen joint count; SJC), and one item depending on patient and physician (68-tender joints count; TJC) [9].
- "Enthesitis assessment: Patients were classified as having clinically defined enthesitis at any site using



the Spondyloarthritis Research Consortium of Canada index (SPARCC). Enthesitis index is a measure of enthesitis based on the presence of tenderness at 18 entheseal sites [10]. Each site's tenderness is reported as either present (1) or absent (0). For scoring purposes, the inferior patella and tibial tuberosity are considered 1 site because of their anatomical proximity. The overall score ranges from 0 to 16; a score of 0 indicates the absence of enthesitis, while a score of 16 indicates the presence of a greater burden of enthesitis. Patients with enthesitis were further classified based on the location of affected sites: upper sites only (medial epicondyle, lateral epicondyle, and supraspinatus insertion into the greater tuberosity of the humerus), lower sites only (greater trochanter, quadriceps tendon insertion into superior border of patella, patellar ligament insertion into inferior pole of patella or tibial tubercle, Achilles tendon insertion into calcaneum, and plantar fascia insertion into calcaneum), and both upper and lower sites."

- Health related quality of life: The Arabic version of 36-item Short-Form Health Survey was used which includes eight subscale scores including the physical function, role-physical, bodily pain, energy, health perception, social function, role emotional, and mental health and contains 36 items. The total score ranges from 0 to 100, and higher scores reflect better health status and less disability, where 0 indicates the worst possible health status [11].
- "Work productivity and activity impairment questionnaire (WPAI) were measured with work limitations questionnaire [12]. It consists of six questions

Variables		Total PSA (<i>n</i> = 88)	Patients with enthesitis (<i>n</i> = 44)	Patients without enthesitis (<i>n</i> = 44)	Test	<i>p</i> -value
Age (years) (mean \pm SD)		41.03 ± 8.40	41.64 ± 6.82	40.43 ± 9.78	0.670	0.504
Age at psoriasis onset (years) (mean \pm SD)		34.85 ± 7.18	35.5 ± 6.25	34.2 ± 8.02	0.845	0.400
Disease duration (years)					2.148	0.058
(mean \pm SD)		6.66 ± 3.95	5.86 ± 3.49	7.45 ± 4.25		
Median (IQR)		6 (3–8)	5 (3–7.25)	7 (4–10.75)		
BMI, kg /m ² (mean \pm SD)		25.56 ± 3.5	26.19 ± 3.82	24.93 ± 3.08	1.716	0.090
Gender, <i>n</i> (%)					0.048	0.826
Male		33 (37.5%)	17 (38.6%)	28 (63.6%)		
Female		55 (62.5%)	27 (61.4%)	16 (36.4%)		
Smoking, <i>n</i> (%)		12 (13.6%)	9 (20.5%)	3 (6.8%)	3.474	0.062
Level of education, <i>n</i> (%)	Primary	26 (29.5%)	14 (31.8%)	12 (27.3%)	0.218	0.640
	Secondary	17 (19.3%)	9 (20.5%)	8 (18.2%)	0.073	0.787
	High education	16 (18.2%)	8 (18.2%)	8 (18.2%)	0.00	1.00
	Non-educated	30 (34.1%)	13 (29.5%)	17 (38.6%)	0.809	0.368
Employment status, <i>n</i> (%)	Employed	17 (19.3%)	8 (18.2%)	9 (20.5%)	0.073	0.787
	Housewife	35 (39.8%)	19 (43.2%)	16 (36.4%)	0.427	0.513
	Manual worker	14 (15.9%)	7 (15.9%)	7 (15.9%)	0.00	1.00
	Retired	1 (1.1%)	1 (2.3%)	0	1.011	0.315
	Does not work	54 (61.4%)	29 (65.9%)	25 (56.8%)	0.767	0.381
Arthritis, n (%)	Peripheral arthritis	85 (96.6%)	44 (100%)	41 (93.2%)	3.106	0.078
	Axial arthritis	51(58%)	22 (50.0%)	19 (43.2%)	0.411	0.521
	Upper limb arthritis	32 (36.4%)	20 (45.5%)	24 (54.5%)	0.727	0.394
	Lower limb arthritis	34 (38.6%)	19 (43.2%)	15 (34.1%)	0.767	0.381
Inflammatory back pain, <i>n</i> (%)		41 (46.6%)	22 (50%)	19 (43.2%)	0.411	0.521
Cervical pain, <i>n</i> (%)		11 (12.5%)	4 (9.1%)	7 (15.9%)	0.935	0.334
Clinical sacroiliitis, n (%)		30 (34.1%)	15 (34.1%)	15 (34.1%)	0.00	1.00
Radiological sacroiliitis, n (%)		37 (42%)	18 (40.9%)	19 (43.2%)	0.047	0.829
Extra-articular manifestations, n (%)	Nail involvement	23 (26.1%)	12 (27.3%)	11 (25%)	0.059	0.808
	Uveitis	5 (5.7%)	3 (6.8%)	2 (4.5%)	0.212	0.645
	CVS	7 (8%)	4 (9.1%)	3 (6.8%)	0.155	0.694
	Dactylitis	14 (15.9%)	8 (18.2%)	6 (13.6%)	0.340	0.560

Table 1 Demographic, clinical characteristics of patients suffering from psoriasis-related enthesitis and those without enthesitis

BMI Body mass index, CVS Cardiovascular system

(yes/no) and yields four scores: the percentage of absenteeism (work time missed due to PsA), the percentage of presenteeism (reduced productivity at work due to PsA), an overall work impairment (combines absenteeism and presenteeism), and percentage of impairment in daily activities (outside work activities). WPAI outcomes are expressed as impairment percentages, with higher numbers indicating greater impairment and less productivity."

- "Global disability: Physical functional ability was assessed by using the validated Arabic version of the Health Assessment Questionnaire Disability Index (HAQ-DI). 'It is self-administered contains 20 items divided into 8 domains with each score ranging from 0 (no disability) to 3 (maximal disability).' Functional disability was defined as a cut-off of the HAQ-DI score ≥ 1 according to preceding studies [13]."
- Psoriasis Area and Severity Index (PASI): Is the most widely used tool for the measurement of severity of psoriasis. PASI combines the assessment of the

severity of lesions and the area affected into a single score in the range 0 (no disease) to 72 (maximal disease) [14].

 Psoriatic arthritis impact of disease (PsAID-12): It is as core instrument to measure health-related quality of life in PsA in clinical trials. It measures the difficulty the patient had in doing daily physical activities due to psoriatic arthritis during the last week [15]. It includes 12 domains of health, each assessed by a single question with response on an NRS.

Results

A total 88 PsA patients (33 males and 55 females), with a mean age of 41.03 ± 8.4 years and disease duration of 6.66 ± 3.95 years, were enrolled in this study. There were no statistically significant differences between the studied groups as regard age, age at psoriasis onset, disease duration, body mass index (BMI), gender, smoking, level

 Table 2
 Laboratory results and medications received by patients suffering from psoriasis-related enthesitis and those without enthesitis

Variables			Total PSA (<i>n</i> = 88)	Patients with enthesitis (<i>n</i> = 44)	Patients without enthesitis ($n = 44$)	Test	<i>p</i> -value
DAPSA							
(mean ± SD)			16.17 ± 6.91	19.82 ± 6.17	12.52 ± 5.59	-4.979	< 0.001*
Median (IQR)			16 (12–22)	20 (16–24)	12 (10–16)		
PASI							
(mean \pm SD)			12.74 ± 10.22	13.82 ± 10.28	11.66 ± 10.15	-1.914	0.056
Median (IQR)			10 (6–16)	10 (8–16)	8 (5–14)		
PSAID 12						-8.228	< 0.001*
(mean ± SD)			4.63 ± 3.42	7.79 ± 1.69	1.45 ± 0.5		
Median (IQR)			3.5 (1–8)	8 (6–9)	1 (1–2)		
SPARCC index						-8.686	< 0.001*
(mean ± SD)			3.73 ± 3.99	7.45 ± 1.93	0		
Median (IQR)			1.5 (0–8)	8 (6–8)			
Acute phase reactant	ESR		30.05 ± 7.96	29.36 ± 6.22	30.73 ± 9.42	-0.802	0.425
	CRP					-1.852	0.064
	Median (IQR)		8.72 ± 12.17 5.2 (3.9–8.2)	11.37 ± 16.35 7.6 (4.2–8.2)	6.07 ± 4.23 5.2 (2.8–7.6)		
	NSJ		2.6 ± 1.08	2.43 ± 0.87	2.79 ± 1.2	-1.58	0.117
	NTJ		13.92 ± 4.3	14.54 ± 4.12	13.29 ± 4.61	1.33	0.184
Current medications, n (%)	NSAIDs		70 (79.5%)	44 (100%)	26 (59.1%)	22.629	< 0.001*
	Corticosteroids		6 (6.8%)	4 (9.1%)	2 (4.5%)	0.715	0.398
	c-DMARDs	MTX	18 (20.5%)	7 (15.9%)	11 (25%)	1.117	0.290
		SSZ	3 (3.4%)	3 (6.8%)	0	3.106	0.078
	Biological	Anti-TNF	25 (28.4%)	14 (31.8%)	11 (25%)	0.503	0.478
		Anti-IL-17	40 (45.5%)	23 (52.3%)	17 (38.6%)	1.650	0.199

DAPSA disease activity in psoriatic arthritis disease, PASI Psoriasis Area and Severity Index, PSAID psoriatic arthritis impact of disease, SPARCC index Spondyloarthritis Research Consortium of Canada index, ESR erythrocyte sedimentation rate, CRP C-reactive protein, NSJ number of swollen joints, NTJ number of tender joints, NSAIDs nonsteroidal anti-inflammatory drugs, c-DMARDs conventional disease-modifying antirheumatic drugs, MTX methotrexate, SSZ salazopyrine, anti-TNF anti-tumor necrosis factors, anti-IL-17 anti-interleukin-17, *P \leq 0.05 = significant

of education, employment status, arthritis, inflammatory back pain, cervical pain, sacroiliitis, and extra-articular manifestations (Table 1).

Table 2 showed that there were no statistically significant differences between the studied groups as regards PASI score, acute phase reactant (ESR, CRP), number of swollen joints (NSJ), number of tender joints (NTJ), corticosteroids, c-DMARDs, and biological medications. However, there was statistically significant difference between the studied groups as regard DAPSA score, PSAID, and SPARCC index with higher mean score in patients with enthesitis (19.82 \pm 6.17), (7.79 \pm 1.69), and (7.45 \pm 1.93), respectively. NSAID usage was also significantly higher in patients with enthesitis compared to those without.

As regarding HAQ-DI, there were statistically significant differences between the studied groups with higher mean value in patients with enthesitis (3.23 ± 1.96). Also,

there were statistically significant differences between the studied groups as regard SF-36 (total score, physical, role limitation-emotional health (RLEH), fatigue, emotional well-being, social functioning, and general health with higher mean value in patients without enthesitis except for RLEH where the highest mean value was in patients with enthesitis (56.06 ± 13.23). Additionally, there were statistically significant differences between the studied groups as regards WPAI (total score and absenteeism) with higher mean value in patients with enthesitis (50.91 ± 15.52) and (0.68 ± 0.47), respectively (Table 3).

Although there were no statistically significant differences in quality-of-life grade between the study groups, about 61.4% of patients without enthesitis reported good quality of life versus 43.2% of those with enthesitis. However, the majority of patients with enthesitis had a higher percentage of impairment in daily activities (95.5%) than those without enthesitis (38.6%) (Table 3).

Table 3 Quality of life of patients suffering from psoriasis-related enthesitis and those without enthesitis

Variables			Total PSA (n =88)	Patients with enthesitis (<i>n</i> =44)	Patients without enthesitis (<i>n</i> =44)	Test	<i>p</i> -value
HAQ-DI							
(mean ± SD)			2.5 ± 1.6	3.23 ± 1.96	1.77 ± 0.52	-4.73	< 0.001*
Median (IQR)			2 (2–3)	3 (2–4)	2 (1–2)	3	
$\text{SF-36} \mbox{ (mean} \pm \mbox{SD})$		Total	57.34 ± 7.61	55.41 ± 7.92	59.27 ± 6.83	-2.449	0.016*
		Physical functioning Median (IQR)	50.91 ± 16.44 50 (40–70)	46.14 ± 18.19 45 (30–60)	55.68 ± 13.01 50 (50–70)	-2.773	0.006*
		RLPH	57.16 ± 12.93	55.34 ± 12.12	58.98 ± 13.58	-1.325	0.189
		RLEH	52.84 ± 13.29	56.06 ± 13.23	49.61 ± 12.72	2.329	0.022*
		Fatigue Median (IQR)	43.39 ± 16.18 42 (30–56)	39.20 ± 17.82 30 (25–56)	47.59 ± 13.27 50 (35–59.5)	-2.698	0.007*
		Emotional well-being Median (IQR)	42.03 ± 21.21 30 (25–60)	32.91 ± 16.92 25 (20–35)	51.16 ± 21.29 56.5 (30–67.5)	-3.740	<0.001*
		Social functioning Median (IQR)	37.27 ± 13.89 30 (30–50)	31.36 ± 12.26 30 (25–30)	43.18 ± 12.99 40 (30–55)	-4.734	<0.001*
		Bodily pain Median (IQR)	29.95 ± 11.01 30 (20-38.88)	30.82 ± 11.44 25 (20-45)	29.09±10.64 30 (20-38.8)	-0.477	0.633
		GH Median (IQR)	44.19 ± 16.57 45 (25-60)	34.76 ± 15.81 27.5 (25–45)	53.18 ± 11.62 52.5 (45–60)	-5.172	< 0.001*
WPAI (mean \pm SD)		Total	37.16 ± 18.75	50.91 ± 15.52	23.41 ± 9.14	10.12	< 0.001*
		Absenteeism Median (IQR)	0.5 ± 0.5 0.5 (0-1)	0.68 ± 0.47 1 (0-1)	0.32 ± 0.47 0 (0-1)	-3.392	0.001*
		Presenteeism Median (IQR)	0.68 ± 0.47 1 (0-1)	0.77 ± 0.42 1 (0.75-1)	0.59 ± 0.49 1 (0-1)	-1.821	0.069
		Work productivity loss	6.07 ± 1.12	6.29 ± 0.76	5.84 ± 1.36	1.929	0.057
		Daily activities impairment	4.52 ± 1.69	4.52 ± 1.7	4.52 ± 1.7	0.00	1.00
Quality grade (SF-36)	Impaired	42 (47.7%)	25 (56.8%)	17 (38.6%)	42 (47.7%)	2.915	0.088
	Good	46 (52.3%)	19 (43.2%)	27 (61.4%)	46 (52.3%)		
Percentage of impair-	Good	29 (33%)	2 (4.5%)	27 (61.4%)	29 (33%)	32.145	< 0.001*
ment in daily activities	Impaired	59 (67%)	42 (95.5%)	17 (38.6%)	59 (67%)		

HAQ-DI Health Assessment Questionnaire Disability Index, RLPH role limitation-physical health, RLEH role limitation-emotional health, SF-36 Short Form 36, GH general health, WPAI work productivity and activity impairment questionnaire, *P \leq 0.05 = significant

Table 4 Numbers and percentages of entheseal sites involved in the psoriatic arthritis patients with enthesitis according to SPARCC score

Entheseal sites	(<i>n</i>)	(%)
Rt supraspinatus tendon	2	4.54%
Lt supraspinatus tendon	3	6.8%
Rt lateral epicondyle	9	20.45%
Lt lateral epicondyle	12	27.2%
Rt medial epicondyle	4	9.1%
Lt media epicondyle	6	13.6%
Rt greater trochanter	5	11.36%
Lt greater trochanter	6	13.6%
Rt quadriceps tendon	15	34.1%
Lt quadriceps tendon	24	54.4%
Rt patellar ligament	19	43.18%
Lt patellar ligament	3	6.8%
Rt Achilles tendon	32	72.7%
Lt Achilles tendon	37	84.09%
Rt plantar fascia	38	86.3%
Lt plantar fascia	35	79.54%

The distribution of enthesitis sites according to the SPARCC index is shown in Table 4, with Rt. plantar fascia (86.3%) being the most prevalent enthesitis site, followed by Lt Achilles tendon (84.09%), Lt. plantar fascia (79.54%), and Rt. Achilles tendon (72.7%). Patients with both upper and lower limb entheseal site affection had significantly reduced quality of life as measured by SF-36 and impairment in daily activities as measured by WPAI ($P \le 0.05$) (Table 5).

Also, there was a statistically significant positive correlation between NTJ and work productivity loss and a statistically significant positive correlation between PASID12 and absenteeism, as well as a statistically significant positive correlation between SPARCC index and both absenteeism and work productivity loss (Table 6, Figs. 2 and 3). Multivariate analysis revealed that SPARCC index was a significant risk factor for impaired productivity (Table 7).

Statistical analysis

All data were collected, tabulated, and statistically analyzed using SPSS 26.0 for windows (SPSS Inc., Chicago, IL, USA). Quantitative data were expressed as the mean \pm SD and median (interquartile range), and qualitative data were expressed as absolute frequencies (number) and relative frequencies (percentage). Independent samples Student's *t*-test was used to compare between two groups of normally distributed variables, while Mann-Whitney *U*-test was used for non-normally distributed variables.

Percent of categorical variables were compared using chi-square test or Fisher's exact test when appropriate. Spearman's rank correlation coefficient was calculated to assess relationship between various study variables, (+) sign indicates direct correlation, and (-) sign indicates inverse correlation; also, values near to 1 indicate strong correlation, and values near 0 indicate weak correlation. Multivariate logistic regression was done to detect prognostic risk factors for impaired employment. All tests were two sided. *P*-value ≤ 0.05 was considered statistically significant (S); *P*-value > 0.05 was considered statistically insignificant (NS).

Discussion

In this study, we analyzed the prevalence of clinical enthesitis in PsA, its association with clinical variables, and its burden on QOL and work productivity. The present study showed that enthesitis was detected in 50% (44/88) of the included PsA patients, in agreement with the findings of previous reports in which the prevalence of enthesitis was as high as 35–50% [16–18]. In fact, it is claimed that musculoskeletal ultrasound (US) is a more sensitive diagnostic tool for enthesitis than clinical examination [19]. However, because radiography is inconclusive, enthesitis is frequently evaluated

 Table 5
 Quality of life and daily activity impairment in patients suffering from psoriasis-related enthesitis based on the location of

 SPARCC enthesitis sites

Variables		Patients with enthesitis ($n = 44$)	Sites of enthesitis			
			Upper sites only N (%)	Lower sites only	Both upper and lower sites <i>N</i> (%)	
		N (%)		N (%)		
Quality of life	Poor	25 (56.8%)	3 (6.8%)	6 (13.6%)	16 (36.4%)	0.018*
	Good	19 (43.2%)	5 (11.4%)	10 (22.7%)	4 (9.1%)	
Impairment in daily activities	Impaired	42 (95.5%)	6 (13.6%)	16 (36.4%)	20 (45.5%)	0.029*
	Good	2 (4.5%)	2 (4.5%)	0 (0%)	0 (0%)	

SF-36 Short Form 36, P-value was calculated using the Fisher exact test, $*P \le 0.05 =$ significant

Variable	Psoriatic arthritis								
	Absenteeism		Presentism		Work productivity loss		Activity impairment		
	R	p	r	p	r	р	R	р	
Age	0.076	0.483	0.027	0.800	0.118	0.273	-0.048	0.656	
Disease duration	-0.059	0.582	0.090	0.405	0.062	0.567	0.010	0.926	
NSJ	0.022	0.898	0.083	0.441	0.132	0.219	-0.115	0.287	
NTJ	0.169	0.115	-0.025	0.82	0.565	< 0.001*	0.036	0.763	
PASI	0.052	0.630	0.136	0.205	-0.041	0.705	0.070	0.519	
DAPSA	0.151	0.162	0.125	0.244	0.098	0.364	-0.009	0.937	
PASID	0.310	0.003*	0.131	0.223	0.126	0.244	0.016	0.884	
HAQ DI	-0.163	0.128	-0.129	0.231	-0.100	0.356	0.055	0.610	
SF-36	-0.100	0.354	-0.082	0.449	-0.150	0.162	-0.088	0.412	
SPARCC index	0.366	< 0.001*	0.156	0.147	0.256	0.016*	0.066	0.540	

Table 6 Correlations of work impairment with different disease parameters in PSA patients

DAPSA Disease activity in psoriatic arthritis disease, PASI Psoriasis Area and Severity Index, PSAID Psoriatic arthritis impact of disease, SPARCC index Spondyloarthritis Research Consortium of Canada index, NSJ Number of swollen joints, NTJ Number of tender joints, HAQ-DI Health Assessment Questionnaire Disability Index, SF-36 Short Form 36, *P $\leq 0.05 =$ significant

clinically [20], and it is challenging for physicians to include US into their routine practice in PsA due to the time required to assess several enthesopathy sites [21].

Furthermore, patients with active entheseal involvement had higher means of DAPSA score, PSAID, and SPARCC index as well as higher means of WPAI, HAQ-DI, and lower values of most of SF-36 scores. And when we analyzed the QOL and percentage of impairment in daily activities of patients in both groups, we found that about 61.4% of patients without enthesitis had good quality of life versus 43.2% of those with enthesitis. Additionally, most of patients with enthesitis had a higher percentage of disability (95.5%) than those without enthesitis (38.6%). Furthermore, enthesitis in both the upper and lower sites was related with worse quality of life (36.4%) and higher work impairment (45.5%)





compared to enthesitis in either the upper or lower sites alone.

Moreover, no statistically significant intergroup differences were detected in terms of demographic and clinical features of patients, as well as PASI score, acute phase reactant (ESR, CRP), NSJ, and NTJ. Other published studies, on the other hand, found that enthesitis was related with extra-articular symptoms (e.g., tenosynovitis and dactylitis), as well as a higher inflamed joint count [17]. Furthermore, several studies have found that individuals with PsA with enthesitis have higher disease activity, worse functional status, and lower quality of life than those without enthesitis [22-24].

The disparities in rates might be attributed to variances in the patients' disease onset profiles, discrepancies in the enthesitis indicators applied, ethnic differences, and changes in the number of patients included in the studies. Furthermore, we did not consider absolute changes in evaluated scores after drug initiation.

Currently, biologic treatments are recommended for patients with severe enthesitis who have failed NSAIDs or local steroid injections [25]. Enthesitis patients used

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Items	В	SE	Wald	df	Sig.	Exp(B)	95% CI for EXP(B)	
							Lower	Upper
Gender	-0.129	0.673	0.037	1	0.848	0.879	0.235	3.285
Axial arthritis	-0.375	0.728	0.265	1	0.607	0.687	0.165	2.863
SPARCC index	0.977	0.517	3.562	1	0.04*	2.656	1.1	7.323
Dactylitis	-0.128	0.889	0.021	1	0.885	0.879	0.154	5.024
Nail psoriasis	0.780	0.836	0.869	1	0.351	2.181	0.423	11.239
PASI	0.006	0.032	0.031	1	0.860	1.006	0.945	1.071
PSAID	-0.395	0.427	0.858	1	0.354	0.673	0.292	1.555
DAPSA	0.054	.066	0.683	1	0.409	1.056	0.928	1.201

 Table 7
 Multivariate analysis of risk factors in patients with impaired work productivity

DAPSA Disease activity in psoriatic arthritis disease, PASI Psoriasis Area and Severity Index, PSAID Psoriatic arthritis impact of disease, SPARCC index Spondyloarthritis Research Consortium of Canada index, * $P \le 0.05 =$ significant

more NSAIDs in this study, but biologic use was equivalent. And it is important to note that 45.5% of enrolled patients are using anti-interleukin-17 (anti-IL-17) in the study population, and it was reported that patients with PsA who received anti-IL-17 agents had statistically greater improvement in their signs and symptoms, including enthesitis, than patients who received a placebo [26].

Regarding work-related factors associated with the development of work restrictions, as measured by the WPAI in PsA patients, there was an association between NTJ and work productivity loss and a positive correlation between PASID12 and absenteeism. This suggests that PsA has a greater impact on patients' lives and is consistent with previous research showing that joint activity in PsA patients is positively associated with physical functional disability, and it has been claimed that there is a strong relationship between QOL and work productivity, and that absenteeism and presenteeism differ by country due to cultural, economic, and health insurance factors [27].

Interestingly, there was a statistically significant positive correlation between the SPARCC index and both absenteeism and work productivity loss, as well as the linear regression analysis results, indicating that enthesitis, as measured by the SPARCC index, was a significant risk factor for reduced work productivity. Hence, after multivariate analysis, the key findings in the present study were the significant relationship of enthesitis in PsA and work impairment.

The above-mentioned finding matched data from a multinational patient and physician survey in which participants with enthesitis reported a greater impact on work than those without enthesitis, including statistically worse presenteeism, overall work impairment, and activity impairment outside of work [18]. As a result, we would advocate monitoring the level of performance at work while assessing response to treatment in these patients in order to reduce the economic and social burden of absenteeism and presenteeism.

The main limitation of this study was its cross-sectional design, which limited the analysis to enthesitis presence or absence and did not account for absolute changes in score as well as enthesitis assessment was subjective, as we did not use diagnostic US machine. One of the study's shortcomings is that patients were only recruited from one point of reference, and the cross-sectional design precluded the development of a temporary correlation between the impacts of the parameters assessed and overall work capacity. More data on the effectiveness of PsA therapy for enthesitis and their outcome on the quality of life and work productivity are needed in order to help the clinicians to treat different disease presentations.

Conclusions

Enthesitis was a frequent complaint among PsA patients. PsA patients with enthesitis had a significant disease burden regardless of enthesitis location, and patients with enthesitis in both the upper and lower sites have a worse quality of life and a higher work impairment.

Abbreviations

Anti-IL-17: Anti-interleukin-17; Anti-TNF: Anti-tumor necrosis factors; BMI: Body mass index; CASPAR: CIASsification criteria for Psoriatic Arthritis; c- DMARDs: Conventional disease-modifying antirheumatic drugs; CRP: C-reactive protein; DAPSA: Disease activity in psoriatic arthritis disease; ESR: Erythrocyte sedimentation rate; HAQ-DI: Health Assessment Questionnaire Disability Index; PsA: Psoriatic arthritis; QOL: Quality of life; MTX: Methotrexate; NSJ: Number of swollen joints; NTJ: Number of tender joints; NSAIDs: Nonsteroidal anti-inflammatory drugs; NRS: Numeric rating scale; PCS: Physical component summary; PASI: Psoriasis Area and Severity Index; PSAID: Spariasis Area and Severity Index; PSAID: Spariasis Area and Severity Index; PSAID: Spariasis Area and Severity Index; PSAID: Psoriasis Area and Severity Index; PSAID: Spariasis Area and Severity Index; PSAID: Psoriasis Area and Severity Index; SF-36: Short Form 36; US: Ultrasound; WPAI: Work productivity and activity impairment questionnaire.

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Authors' contributions

All authors have contributed to designing the study, collecting and analyzing, interpretation of data, and preparing and revising the manuscript. Design of the study, DF, WK and RZ. Recruitment of patients, DF, WK and RZ. Data collection, DF, WK and RZ. Manuscript preparation and revision, DF, WK and RZ. All co-authors have approved the final manuscript.

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Availability of data and materials

The data will be available upon request.

Declarations

Ethics approval and consent to participate

An approval was obtained from the ethics committee of the Faculty of Medicine, Zagazig University, and the approval number was ZU-IRB#9018. The study was conducted in accordance with the ethical standards of the Declaration of Helsinki. Informed written consents were obtained from all patients.

Consent for publication

Not applicable

Competing interests

The authors declare that they have no competing interests.

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