Work Productivity Loss and Fatigue in Psoriatic Arthritis

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ABSTRACT. ***Objective.*** To explore the relationship between fatigue and work productivity loss (WPL) in people with psoriatic arthritis (PsA).

Methods. Data were collected from participants in the Utah Psoriasis Initiative Arthritis registry between January 2010 and May 2013. WPL was measured with the 8-item Work Limitations Questionnaire. Fatigue was assessed with question 1 from the Bath Ankylosing Spondylitis Disease Activity Index (BASDAI#1), "How would you describe the overall level of fatigue/tiredness you have experienced?" and with question 1 from the Psoriatic Arthritis Quality of Life Questionnaire (PsAQOL#1) "I feel tired whatever I do." Psoriatic activity was evaluated with tender joint count (TJC), swollen joint count (SJC), dactylitis count, enthesitis count, inflammatory back pain (IBP), physician global assessment, body surface area, and psoriasis pain and itch.

Results. Among 107 participants, work productivity was reduced by 6.7%, compared to benchmark employees without limitations. Fatigue was reported by 54 patients (50.5%) on PsAQOL#1, and 64 (60.0%) were classified as high fatigue by BASDAI#1. TJC, SJC, enthesitis count, IBP, and depressed mood were highest or most frequent in participants reporting fatigue. After adjustments for psoriatic activity and depressed mood, WPL was associated with fatigue, as measured by PsAQOL#1 ($p = 0.01$) and BASDAI#1 ($p = 0.002$).

Conclusion. WPL was associated with fatigue, and the association was not entirely explained by the evaluated musculoskeletal, cutaneous, or psychiatric manifestations of PsA. (J Rheumatol First Release July 15 2014; doi:10.3899/jrheum.140259)

Key Indexing Terms:
PSORIATIC ARTHRITIS WORK DISABILITY FATIGUE QUALITY OF LIFE

Work disability is common in psoriatic arthritis (PsA). Unemployment due to ill health has been reported in 20% to 50% of people with PsA, and 16% to 49% had health-related limitations at work, including time away from work (absenteeism) or reduced effectiveness at work (presenteeism)[1,2]. In a National Psoriasis Foundation survey, 49% routinely missed work due to psoriasis or PsA, and 31% of these respondents missed > 10 days per month[2]. Work disability affects an individual's quality of life and the socioeconomic implications are substantial. For example, in Norwegian patients with PsA taking disease-modifying antirheumatic drugs (DMARD), the cost of absenteeism over a 2-year period ranged from 14,209 to 78,009 euros (18,865–103,555 in 2010 US$)[3].

Fatigue is also common and burdensome in people with PsA. Moderate to severe fatigue occurred in 50% of participants in a PsA cohort[4], and fatigue and sleep disorders have been reported to account for 27% of PsA disease burden[5]. The effect of fatigue on quality of life is underrecognized and the effect of fatigue on work productivity has not been characterized.

The purpose of our study was to explore the relationship between fatigue and presenteeism among employed participants of the Utah Psoriasis Initiative Arthritis (UPI Arthritis) registry. Our first goal was to determine whether fatigue and presenteeism were associated, independent of musculoskeletal and cutaneous psoriatic activity. We also aimed to characterize the effect of depressed mood on the relationship between fatigue and presenteeism.

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MATERIALS AND METHODS

Population. This retrospective cross-sectional study was conducted between January 2010 and May 2013. Recruitment letters for the UPI Arthritis registry were mailed to 1213 adult participants of the cutaneous UPI registry. Interested participants were invited to arrange a rheumatologic study evaluation. Patients with psoriasis attending dermatology and rheumatology clinics at the University of Utah were also invited to participate. Participants were included in this study if they had a diagnosis of PsA, according to the judgment of the study rheumatologist (JAW), and were employed at the time of the evaluation. This research was conducted in compliance with the Helsinki Declaration and with the approval of the University of Utah Institutional Review Board.

Variables. Presenteeism was measured with the 8-item Work Limitations Questionnaire (WLQ). The 8-item WLQ is a shortened version of the original 25-item WLQ and consists of the questions that were most predictive of productivity. The 25-item WLQ has been validated in several populations, including a psoriatic arthritis population[6,7]. The 8-item WLQ contains a Work Productivity Loss (WPL) score and 4 domains that assess limitations in specific types of tasks within the prior 2 weeks. The WLQ WPL is a weighted score that assesses the overall reduction in work productivity due to health. Each of the 4 domains contains 2 questions with scores ranging from 1 to 5, with 1 indicating no limitations and 5 indicating limitations 100% of the time. The Time Management domain addresses difficulties performing a job at the beginning of the work day and starting the job soon after arriving at work. The Physical Demands domain pertains to tasks involving repetitive motions and sitting or standing in 1 position. The Mental-Interpersonal Demands domain addresses concentration and interactions with people. The Output Demands domain addresses workload and the ability to complete work on time.

Two variables were used to assess fatigue, including question 1 from the Psoriatic Arthritis Quality of Life Questionnaire (PsAQOL#1)[8]: "I feel tired whatever I do," and question 1 from the Bath Ankylosing Spondylitis Disease Activity Index (BASDAI#1)[9]: "How would you describe the overall level of fatigue/tiredness you have experienced?" For BASDAI#1, a median split was used to classify participants as having low fatigue (BASDAI < 6) or high fatigue (BASDAI ≥ 6). Psoriatic activity was assessed with a tender joint count (TJC; 0–68), swollen joint count (SJC; 0–66), dactylitis count (0–20), enthesitis count (0–8), and the presence of inflammatory back pain. The evaluated entheses included the insertions at the bilateral lateral epicondyles, medial femoral condyles, distal Achilles tendons, and plantar fascia. Cutaneous psoriasis severity was measured with a static physician global assessment (PGA), body surface area (BSA), and the product of the PGA and BSA (PGA × BSA)[10]. The National Psoriasis Foundation Psoriasis Score (NPF-PS) version of PGA was calculated by averaging the total body erythema, induration, and desquamation scores[11]. Erythema, induration, and desquamation were scored on a 6-point scale, ranging from 0 (clear) to 5 (severe). BSA was defined as the percent of body surface involvement, where 1% is about the area of the patient's handprint. Psoriasis pain and itch were measured with question 4 from the Dermatology Life Quality Index (DLQI#4): "Over the past week, how itchy, painful, sore, or stinging has your skin been?"[12]. Depressed mood was measured with PsAQOL question 4 (PsAQOL#4): "I feel there is no enjoyment in my life"[8].

Analyses. Chi square, Fisher's exact test, t test, and Wilcoxon rank sum statistics were used to compare demographics and disease characteristics. Analysis of covariance was used to determine the adjusted mean WLQ scores for PsAQOL#1 and BASDAI#1. Covariates included age, sex, TJC, SJC, enthesitis count, inflammatory back pain, PGA × BSA, psoriasis pain and itch, and depressed mood.

RESULTS

Population. Among the 205 UPI Arthritis participants with PsA, 94 (45.9%) were excluded because they were not employed at the time of evaluation. Four participants (3.6%) were excluded because of missing data. Analyses were completed in the remaining 107 participants. Fifty-four (50.5%) were classified as having fatigue according to PsAQOL#1, and 64 (60.0%) were classified as high fatigue by BASDAI#1. Sufficient data were available to apply ClASsification criteria for Psoriatic ARthritis (CASPAR)[13] in 104 of the 107 participants (97.2%), and CASPAR criteria were fulfilled by 99 participants (95.2%).

Fatigue, psoriatic activity, and depressed mood. When fatigue was measured by PsAQOL#1, several psoriatic activity measures were higher or more frequent in participants with fatigue than in those without fatigue, including TJC ($p = 0.001$), enthesitis count ($p = 0.01$), and inflammatory back pain ($p < 0.001$; Table 1). When fatigue was measured by BASDAI#1, TJC ($p = 0.003$), SJC ($p = 0.007$), enthesitis count ($p = 0.004$), and inflammatory back pain ($p < 0.001$) were higher or more frequent in participants with high fatigue than in those with low fatigue. Depressed mood was most frequent in the fatigued/high fatigued groups, when fatigue was measured by PsAQOL#1 ($p = 0.03$) and BASDAI#1 ($p < 0.001$).

WPL from presenteeism. Work productivity was reduced by 6.7% ± 5.3%, compared to benchmark employees without limitations from the populations used to develop and validate the WLQ instruments (Figure 1). The percent time with impaired job performance, as measured by the Physical Demands domain was 34.0% ± 26.0%. Similarly, the percent time with impaired job performance, as measured by the Time Management, Mental-Interpersonal, and Output domains occurred in 31.8% ± 28.2%, 19.8% ± 19.4%, and 23.0% ± 26.4%, respectively.

When fatigue was measured by PsAQOL#1, the unadjusted WLQ WPL score and all WLQ domains were associated with fatigue (Table 2). The mean decrease in work productivity attributed to health was 4.5% in participants without fatigue and 8.6% in participants with fatigue ($p < 0.001$). After adjustment for age, sex, TJC, SJC, enthesitis count, inflammatory back pain, PGA × BSA, and psoriasis pain and itch, the WLQ WPL score and all WLQ domains remained statistically associated with fatigue ($p < 0.001$–0.017). When depressed mood was subsequently added to the model, the WPL score, Mental-Interpersonal domain, and Physical Demands domain were statistically associated with fatigue as measured by PsAQOL #1 ($p = 0.010$, $p = 0.017$, and $p = 0.004$, respectively).

In participants with low and high fatigue (BASDAI#1), the mean unadjusted decrease in work productivity was 3.8% and 8.5%, respectively ($p < 0.001$; Table 3). All unadjusted WLQ domains scores were significantly higher in participants with high fatigue than participants with low fatigue. The WPL score and all WLQ domain scores remained statistically associated with fatigue, after adjustment for age, sex, and the psoriatic disease activity measures. When depressed mood was subsequently added to

Table 1. Demographics and disease characteristics. Data are mean ± SD unless otherwise indicated.

Characteristic	PsAQOL #1 No Fatigue, n = 53	PsAQOL #1 Fatigue, n = 54	p	BASDAI#1 Low Fatigue (BASDAI#1 < 6), n = 43	BASDAI#1 High Fatigue (BASDAI#1 ≥ 6), n = 64	p
Age, yrs	47.0 ± 11.9	48.4 ± 10.1	0.81	47.5 ± 12.4	48.0 ± 10.1	0.89
Male sex, n (%)	32 (60.4)	28 (51.9)	0.37	27 (62.8)	33 (51.6)	0.25
White, n (%)	50 (94.3)	49 (90.7)	0.71	41 (95.3)	59 (92.2)	0.29
Body mass index	29.9 ± 7.8	32.7 ± 9.4	0.14	30.6 ± 10.7	31.8 ± 7.4	0.13
Duration of PsA, yrs	10.4 ± 11.8	10.1 ± 10.6	0.57	10.2 ± 11.7	10.1 ± 10.8	0.48
Tender joint count, scale range 0–68	4.1 ± 5.8	10.4 ± 10.9	0.001	4.0 ± 5.1	9.4 ± 12.4	0.003
Swollen joint count, scale range 0–66	3.0 ± 5.3	4.7 ± 6.0	0.06	2.3 ± 3.7	4.7 ± 6.5	0.007
Dactylitis count, scale range 0–20	0.6 ± 1.7	0.4 ± 1.0	0.76	0.4 ± 1.2	0.5 ± 1.4	0.49
Enthesitis count*, scale range 0–8	0.4 ± 0.9	0.8 ± 1.0	0.01	0.3 ± 0.7	0.8 ± 1.1	0.004
Inflammatory back pain, n (%)	12 (22.6)	29 (53.7)	< 0.001	9 (20.9)	31 (48.4)	< 0.001
PGA × BSA, scale range 0–500	7.6 ± 16.4	3.0 ± 4.0	0.07	6.4 ± 16.1	4.5 ± 8.5	0.91
Psoriasis pain and itch, scale range 0–4	1.2 ± 1.0	1.0 ± 0.76	0.25	0.9 ± 0.95	1.2 ± 0.95	0.16
Depressed mood	3 (5.7)	11 (20.4)	0.03	3 (7)	11 (17.2)	< 0.001

*Evaluated entheses included the insertions at the bilateral lateral epicondyles, medial femoral condyles, distal Achilles tendons, and plantar fascia. BASDAI: Bath Ankylosing Spondylitis Disease Activity Index; PsAQOL: Psoriatic Arthritis Quality of Life Questionnaire; PsA: psoriatic arthritis; PGA × BSA: the product of physician global assessment (PGA) and body surface area (BSA).

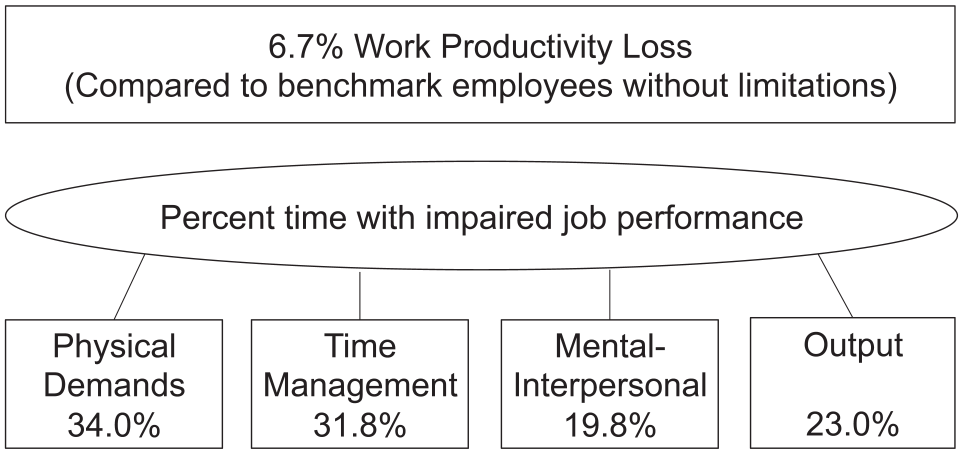

Figure 1. Percentage of time in which job performance was impaired, as measured by the various domains of the Work Limitations Questionnaire.

Table 2. Work productivity loss from presenteeism in PsA participants with and without fatigue, as measured by PsAQOL#1.

	Unadjusted Mean WLQ ± SD			Mean WLQ ± SE Adjusted for Age, Sex, and Psoriatic Disease Activity*			Mean WLQ ± SE Adjusted for Age, Sex, Psoriatic Disease Activity* and Depressed Mood		
WLQ Scales	No Fatigue	Fatigue	p	No Fatigue	Fatigue	p	No Fatigue	Fatigue	p
WLQ productivity loss	4.5 ± 5.1	8.6 ± 4.8	< 0.001	5.4 ± 0.8	9.4 ± 0.8	< 0.001	7.8 ± 1.0	10.7 ± 0.8	0.010
Time management	24.7 ± 31.2	39.8 ± 24.2	< 0.001	31.1 ± 4.4	46.1 ± 4.4	0.017	37.5 ± 5.6	49.0 ± 4.7	0.072
Mental-interpersonal	13.7 ± 20	25.9 ± 19.9	< 0.001	17.8 ± 3.0	31.7 ± 3.0	0.001	25.7 ± 3.7	35.6 ± 3.2	0.017
Output	14.0 ± 25.1	29.5 ± 25.8	< 0.001	17.3 ± 4.3	32.4 ± 4.3	0.011	30.5 ± 5.1	39.5 ± 4.3	0.111
Physical demands	22.6 ± 26.1	45.4 ± 22.2	< 0.001	25.8 ± 4.1	46.3 ± 4.1	< 0.001	32.7 ± 5.2	50.1 ± 4.4	0.004

*Psoriatic disease activity measures included tender joint count, swollen joint count, enthesitis count, inflammatory back pain, PGA × BSA, and psoriasis pain and itch. WLQ: Work Limitations Questionnaire; PsAQOL: Psoriatic Arthritis Quality of Life Questionnaire.

Table 3. Work productivity loss from presenteeism in psoriatic arthritis (PsA) participants with low and high fatigue as measured by BASDAI#1.

WLQ Scales	Unadjusted Mean WLQ ± SD			Adjusted for Age, Sex, and Psoriatic Disease Activity*		Adjusted for Age, Sex, Psoriatic Disease Activity*, and Depressed Mood	
	Low Fatigue	High Fatigue	p	Increase in WLQ for Each 1 Point Increase in BASDAI#1 ± SE	p	Increase in WLQ for Each 1 Point Increase in BASDAI#1 ± SE	p
WLQ productivity loss	3.8 ± 4.3	8.5 ± 5.1	< 0.001	0.92 ± 0.20	< 0.001	0.82 ± 0.18	0.002
Time management	21.8 ± 27.8	39.5 ± 27.4	< 0.001	3.34 ± 1.12	0.004	3.00 ± 1.10	0.127
Mental-interpersonal	10.7 ± 13.9	26.0 ± 22.3	< 0.001	2.87 ± 1.03	0.007	2.91 ± 0.69	< 0.001
Output	9.1 ± 19.2	30.4 ± 27.3	< 0.001	3.27 ± 0.72	< 0.001	3.70 ± 0.69	0.004
Physical demands	23.5 ± 26.2	30.4 ± 27.3	< 0.001	4.20 ± 1.03	< 0.001	2.63 ± 1.03	0.048

*Psoriatic activity measures included tender joint count, swollen joint count, enthesitis count, inflammatory back pain, PGA × BSA, and psoriasis pain and itch. WLQ: Work Limitations Questionnaire; BASDAI: Bath Ankylosing Spondylitis Disease Activity Index; PGA × BSA: the product of physician global assessment (PGA) and body surface area (BSA).

the model, the WPL score, Mental-Interpersonal, Output Demands, and Physical Demands domains were associated with fatigue ($p = 0.002$, $p < 0.001$, $p = 0.004$, and $p = 0.048$, respectively).

DISCUSSION

Patients with PsA frequently report that fatigue limits their quality of life and participation in activities, including work-related activities. Our goal was to gain a better understanding of the effect of fatigue on work productivity. Specifically, we aimed to explore the relationship between fatigue and presenteeism in employed participants of a PsA registry.

Fatigue was related to WPL, and the association was not entirely explained by musculoskeletal or cutaneous psoriatic activity. After adjustment for psoriatic activity, the percentage of WPL was nearly twice as high in the fatigue group as in the no-fatigue group (PsAQOL#1 9.4% vs 5.4%). Thus, fatigue may be clinically important in patients with well-controlled psoriatic disease, as well as in patients with highly active disease.

Several theories have been proposed to explain fatigue in patients with PsA. Pain and discomfort from psoriatic disease likely contribute to fatigue by disturbing sleep. In addition, shared inflammatory mediators may contribute to both fatigue and psoriatic activity. For example, interleukin 1β (IL-1β) and tumor necrosis factor (TNF)-α were elevated in patients with PsA and patients with chronic fatigue syndrome[14,15], and the administration of IL-1β and TNF-α to rats synergistically provoked increased sleep and decreased locomotor activity[16].

While fatigue may be partially explained by pain-related sleep disturbances and shared inflammatory cytokines, the association between presenteeism and fatigue, after adjustment for psoriatic activity, suggested that other factors also contributed to fatigue. Since depression frequently occurs with both fatigue and psoriatic disease[17], we evaluated the effect of depressed mood on the relationship between fatigue and presenteeism. The association between presenteeism and fatigue persisted after adjustment for depressed mood, suggesting that additional unmeasured factors contributed to fatigue.

A limitation of this study is that comorbidities were not systematically evaluated. There are several comorbidities linked with both fatigue and PsA that may have influenced the relationship between fatigue and presenteeism. For example, cardiovascular disease and sleep apnea are associated with fatigue and have been reported to occur more frequently in psoriatic populations than in the general population[17]. In addition, fatigue has been correlated with psychological distress in patients with PsA[4], and we did not comprehensively assess mental health.

Another limitation is that some of the instruments used in our study have not been psychometrically tested in a rigorous manner in PsA populations. Although the 25-item WLQ has been validated in a PsA population[7], the 8-item WLQ has not been previously evaluated in patients with PsA. Additionally, the instruments used to measure fatigue and depressed mood (PsAQOL#1, BASDAI#1, PsAQOL#4) have not been rigorously assessed. The prevalence of fatigue in this study (50.5%) was similar to the prevalence in another PsA registry (49.5%)[4], in which fatigue was measured with an instrument validated in a PsA population[4]. Similarly, the 13% prevalence of depressed mood in our study is similar to the percentages of patients with PsA in other populations with elevated scores on the Hospital Anxiety and Depression Scale (HADS; 11.6% and 17.6%)[18]. Thus, fatigue and depressed mood were unlikely to have been grossly under- or overrepresented in our study.

The generalizability of these study findings is limited to patients with PsA who were employed and attending academic tertiary care medical centers. The relationship between fatigue and work disability was not evaluated in the 45.9% of the registry participants who were not employed at the time of evaluation, and fatigue may have affected their employment status. Also, patients with PsA referred to a

tertiary care center may have more severe or refractory disease. The measures of psoriatic activity in this population were consistent with mild to moderate psoriatic activity; however, functional limitations and therapy regimens may have differed between this population and the general PsA population.

Our study demonstrated that WPL and fatigue are common in patients with PsA. Further, the association between fatigue and WPL was not entirely explained by the evaluated musculoskeletal, cutaneous, or psychiatric manifestations of PsA. Additional research is required to characterize the relationships between fatigue, work productivity, and comorbidities, to develop strategies for evaluating and managing fatigue in people with PsA.

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