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ORIGINAL ARTICLE

Real-world data on change in work productivity, activity impairment, and quality of life in patients with psoriatic arthritis under anti-TNF therapy: a postmarketing, noninterventional, observational study

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Abstract

Objectives To understand change in work productivity, activity impairment, quality of life (QoL), and disease activity in patients with psoriatic arthritis (PsA) receiving anti-tumor necrosis factor (anti-TNF) treatment.

Method One hundred twenty patients with PsA receiving anti-TNF therapy were recruited to this noninterventional, observational study. Work disability was assessed via the Work Productivity and Activity Impairment (WPAI) questionnaire and disease activity was calculated via the 28-joint Disease Activity Score using C-reactive protein (DAS28-CRP) and Disease Activity Index for Psoriatic Arthritis with 28 joints (DAPSA28) score. Patient-reported outcomes (PROs), from visual analog scores and Health Assessment Questionnaire-Disability Index scores, were evaluated to understand the clinical effectiveness at baseline and every 3 months until the month-9 final visit. The American College of Rheumatology (ACR)20/50/70 response criteria were assessed at month 9.

Results A total of 120 patients (females, $n=73$) were enrolled in the study. Mean (SD) age and disease duration were 41.6 ± 11.1 years and 6.9 ± 6.5 years, respectively. The most commonly used TNFα inhibitor was adalimumab (42.4%), followed by etanercept (25.8%). All WPAI questionnaire parameters were reduced at the follow-up visits compared with baseline ($p<0.001$ for all). PROs and disease activity indicators (DAS28-CRP and DAPSA28) significantly improved during the course of anti-TNF treatments ($p<0.001$ for all). Additionally, ACR20/50/70 responses were determined as 86.8%, 63.7%, and 41.8% of patients at the month-9 visit.

Conclusions The real-world data in PsA patients receiving anti-TNF treatment showed improvement in WPAI, QoL, and disease activity over 9 months of treatment.

Trial registration NCT02028169

Key Points
- *Psoriatic arthritis (PsA), with debilitating effects on quality of life, occurs mostly in young adults and has negative impacts on employment status and work productivity.*
- *Early PsA diagnosis and treat-to-target treatment strategies aim to reduce pain and joint damage, as well as improve work productivity.*
- *Real-world data on the impact of treatment with anti-tumor necrosis factor (anti-TNF) agents on work productivity in PsA in the literature is scarce.*
- *Our study of real-world data in patients with PsA receiving anti-TNF treatment showed improvement in work productivity, as well as in clinical and patient-reported outcomes.*

Keywords Anti-TNF · ACR20/50/70 · DAPSA28 · DAS28 · Psoriatic arthritis · Work disability

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Introduction

Psoriatic arthritis (PsA) is a chronic inflammatory and heterogeneous disease characterized by psoriasis and arthritis [1–3]. It causes inflammation at peripheral and axial joints, tendons, entheses, and dactyls and restricts daily activities due to pain and loss of function [1–5]. Moreover, PsA, which mostly appears in younger adults, decreases quality of life (QoL) [6–8]. In addition, PsA negatively affects employment status and work productivity [9].

Results from previous studies show the importance of an early diagnosis of PsA and target-to-treat strategies to reduce pain and joint damage, as well as improve work productivity [4, 6]. Work disability is a major patient outcome for chronic rheumatic diseases, such as PsA [6, 10, 11]. The Work Productivity and Activity Impairment (WPAI) questionnaire is a validated measurement tool of work productivity that results in the following four work-related outcomes: absenteeism (time missed from work), presenteeism (impairment at work), productivity loss (absenteeism plus presenteeism), and overall activity impairment [2, 12].

The primary goals of PsA treatment are to reduce pain and maintain regular joint function and QoL [7, 13]. Additionally, low disease activity and clinical remission are expected from treatment. Several measurement instruments are used to assess disease activity in PsA, such as the 28-joint Disease Activity Score (DAS28) and the Disease Activity Index for PsA (DAPSA) [4, 14]. While DAPSA has been validated with 66 swollen and 68 tender joint counts, DAPSA with 28-joint counts has also been proposed as the modified DAPSA28 score because many databases and registries collect only 28-joint counts, and DAPSA28 is a correlated and validated tool that is sensitive to change [15, 16]. Moreover, the American College of Rheumatology 20% (ACR20) response is a significant parameter for the evaluation of disease activity in clinical trials. This criterion is assessed with the 20%, 50%, and 70% of improvements in tender and swollen joints [2].

A number of biologic and targeted synthetic drugs are used for the efficient treatment of patients with PsA [3]. Most patients need treatment with disease-modifying antirheumatic drugs (DMARDs), such as methotrexate [7]. However, nearly 40% of patients receive treatment with approved biologic disease-modifying antirheumatic drugs (bDMARDs), including tumor necrosis factor (TNF) inhibitors (adalimumab, etanercept, infliximab, golimumab, and certolizumab pegol), interleukin antagonists (ustekinumab and secukinumab) and the selective costimulation modulator abatacept [3, 7, 17]. Anti-TNF agents are the first class of bDMARDs used for the treatment of PsA, with clinical trials showing that they alter the disease process and improve work productivity and QoL of patients with PsA [3, 9]. These agents also have resulted in clinical remission by suppressing disease activity [3, 18].

This postmarketing, noninterventional, observational study aims to understand the change in work productivity and activity impairment, QoL, and disease activity in a real-world setting in patients with PsA receiving anti-TNF treatment over a 9-month period.

Materials and methods

This was an open-label, multicenter, noninterventional, prospective, and observational cohort study in Turkey to investigate the work disability and household productivity of patients with PsA who were on anti-TNF treatment. Diagnosis of PsA was based on the decision of the treating rheumatologist. This study was approved by the Clinical Research Ethics Committee of Hacettepe University on October 31, 2013, with an approval number: 2013/13–03 (KA-130083) and have been conducted in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments. One hundred twenty adults (aged ≥ 18 years) and who were actively working (full-time or part-time) or active as homemakers and students and who met the CASPAR criteria with previously initiated (at any time) anti-TNF therapy (adalimumab, etanercept, golimumab, infliximab, or certolizumab) were enrolled after receipt of their written informed consent [19]. In accordance with the one of the main aims of the study, to understand the change in work productivity and activity impairment, active patients were selected. Patients with a history of allergic reaction to the anti-TNF agents, unable to arrive at follow-up visits on time, and who were enrolled in an interventional clinical trial within 30 days were excluded. Physician- and patient-reported outcome measures were collected at baseline and throughout the 9-month period at 3-month intervals. The study was registered at ClinicalTrials.gov (identifier: NCT02028169).

The primary endpoint of this study was to determine the alteration in work disability. This parameter (work productivity) was assessed via the WPAI questionnaire, measured at baseline and at months 3, 6, and 9 [20]. The WPAI is a six-item questionnaire that investigates the disability of patients at or out of work for the past 7 days. The results are expressed as percentages (%) for four outcomes: work time missed (absenteeism), impairment at work (presenteeism), work productivity loss, and general activity impairment. Only patients employed and self-employed at baseline were assessed for WPAI scores. The WPAI is a validated psychometrically and commonly preferred instrument for measuring health-associated work productivity [21].

As secondary outcomes, disease activity scores; tender and swollen joint counts (TJCs and SJCs, respectively); and patient-reported outcomes (PROs), such as the Health Assessment Questionnaire-Disability Index (HAQ-DI) with 20 questions related to daily life activities and the visual analog scale (VAS) for pain (nocturnal back and total back), fatigue, and global assessment of disease activity (PtGA, patient; physician), were calculated. Additionally, clinical parameters of inflammation, such as C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR), were measured and basic demographic data were collected at baseline. Enthesitis and dactylitis parameters also were assessed for PsA inflammation. Enthesitis was measured using the Maastricht Ankylosing Spondylitis Enthesitis Score in 13 body sites: the bilateral first and seventh costochondral joints, the anterior and posterior superior iliac spine, iliac crests, the fifth lumbar spinous process, and the proximal insertion of the Achilles tendon. These sites were analyzed for the presence of tenderness (1 = tender, 0 = not tender; the sum of the sites score range 0–13) [22]. Dactylitis was assessed in each of the 20 digits of the hands and feet and evaluated as to whether they were swollen through a severity score of 0–3 (where 0 = no swelling or pain and 3 = severe swelling and pain) [23]. For peripheral joint disease activity in patients with PsA, the DAS28-CRP was calculated using 28 TJCs and SJCs, respectively, plus CRP values and PtGA. The expected DAS28 score should be ≤ 2.6 (indicating remission) and > 2.6 to ≤ 3.2 (indicating low disease activity) [14]. DAPSA scores were calculated by summing the 28 TJCs and SJCs, CRP, patient disease activity, and pain assessment values using the following formula:

$$\mathrm{DAPSA28} = (28\mathrm{TJC} \times 1.6) + (28\mathrm{SJC} \times 1.6) + \mathrm{PtGA}(0-10\mathrm{VAS}) + \mathrm{patient}' \mathrm{spainassessment}\ (0-10\mathrm{VAS}) + \mathrm{CRP}(\mathrm{mg/dL})$$

[15].

The cutoff values of disease activities were evaluated as remission (≤ 4), low (> 4 to ≤ 14), moderate (> 14 to ≤ 28), and high (> 28) [24]. Each assessment including questionnaires administered was done at baseline, 3rd, 6th, and 9th month visits.

Data analysis

Analyses of demographic characteristics, medication history, clinical outcomes, and work disability of patients were conducted using descriptive analysis methods. Categorical variables (e.g., sex, employment status, prevalence of anti-TNF type, concomitant medications, work disability outcomes) were summarized using frequency counts and percentages. Continuous variables (e.g., age, clinical measurements, disease activity responsive measurements) were summarized using counts, means, and standard deviation of means. Statistical comparisons between groups as treatment-responsive data for VAS-associated outcomes, DAS28 and DAPSA28 scores, enthesitis and dactylitis scores, ESR and CRP levels, TJCs and SJCs, and HAQ-DI scores, as well as ACR20/50/ACR70 responses, at months 3 and 6 and at the end of the study (month 9) compared with baseline were evaluated using the Friedman test. The Friedman test was used to compare work disability parameters according to WPAI scores between baseline and follow-up visits. When there was significant difference, pairwise comparisons were made using Wilcoxon test. All analyses were performed using IBM SPSS Statistics for Windows, version 21.0. Armonk, NY: IBM Corp.

Results

Demographic data of patients

A total of 120 patients (females, $n = 73$ [60.8%]) with PsA were enrolled in the study. The mean age was 41.6 ± 11.1 years and the mean disease duration since the initial PsA diagnosis was 6.9 ± 6.5 years (Table 1). Approximately half of the patients were homemakers (51%), followed by employers who worked outside the home (35.8%). Among the registered patients, the most commonly used TNFα inhibitor was adalimumab (42.4%), followed by etanercept (25.8%). The detailed baseline characteristics of the patients with PsA are shown in Table 1. Among study patients, 104 (86.7%) completed 3 months, 99 (82.5%) completed 6 months, and 92 (76.7%) completed 9 months (Fig. 1).

Primary endpoint: work productivity in response to therapy

The WPAI questionnaire showed the improvement in work disability of patients with PsA with anti-TNF treatment. The absenteeism values decreased with treatment from 20.8 ± 22.6 ($n = 54$) to 5.5 ± 11.1 ($n = 3$ 3) at the final follow-up compared with baseline ($p < 0.001$). The mean presenteeism was 54.7 ± 22.6 ($n = 55$) at baseline, which decreased significantly to 18.2 ± 18.6 ($n = 35$) at the month-9 follow-up visit ($p < 0.001$). Moreover, work productivity loss showed improvement. The mean work productivity score was 43.6 ± 21.5 ($n = 54$) at baseline and decreased significantly at month 9 to 14.9 ± 13.1 ($n = 33$) ($p < 0.001$). The overall activity impairment decreased from 55.0 ± 21.5 ($n = 56$) to 16.3 ± 18.2 ($n = 37$) at the final follow-up visit ($p < 0.001$), indicating the main improvement of anti-TNF treatment. Moreover, compared with baseline, each follow-up assessment showed significant improvement in all four components of the WPAI questionnaire ($p < 0.001$) (Fig. 2).

Table 1 Patient demographic characteristics

Characteristic	All patients ($N=120$)
Age, years, mean ± SD	41.6 ± 11.1
Female sex, *n* (%)	73 (60.8)
Disease duration, years mean ± SD	6.9 ± 6.5
Employment status, *n* (%)	
Employed outside the home	43 (35.8)
Self-employed	13 (10.8)
Homemaker	61 (50.98)
Student	3 (2.5)
bDMARDs, *n* (%)	
Adalimumab	52 (42.4)
Etanercept	31 (25.8)
Golimumab	28 (23.3)
Infliximab	6 (5.0)
Certolizumab pegol	3 (2.5)
Concomitant medications, *n* (%)	
DMARDs	
Methotrexate	78 (65.0)
Leflunomide	21 (17.5)
Sulfasalazine	18 (15.0)
Hydroxychloroquine	8 (6.7)
Cyclosporine	2 (1.7)
NSAIDs	
Diclofenac	17 (14.2)
Meloxicam	8 (6.7)
Naproxen	4 (3.3)
Etodolac	1 (0.8)
Corticosteroids	
Prednisolone	40 (33.3)
Methylprednisolone	4 (3.3)
Deflazacort	1 (0.8)

Abbreviations: *bDMARDs*, biological disease-modifying antirheumatic drugs; *NSAID*, nonsteroidal anti-inflammatory agents

Secondary endpoints: disease activity in response to therapy

The disease activity was assessed globally by patients and physicians using the VAS tool. The PtGA was 6.73 ± 1.63 ($n=120$) at baseline and then decreased to an average of 3.93 ± 2.76 ($n=103$) at the following visit. Similar results were obtained from physician VAS scores (Fig. 2). All PROs and disease activity indicators significantly changed in response to anti-TNF treatments ($p<0.001$, for all follow-up visits). The data from the global assessment of pain were obtained using the VAS tool and indicated a decrease in pain and fatigue at the 3-, 6-, and 9-month visits compared with baseline (Fig. 2). Furthermore, CRP and ESR values, as well as TJCs and SJCs, decreased sharply at the month-3 follow-up compared with baseline and continued at other visits. Similarly, enthesitis and dactylitis scores were improved ($p<0.001$), decreasing from 1.75 ± 2.37 to 0.45 ± 1.50 and 0.47 ± 1.01 to 0.03 ± 0.24 at the final visit compared with baseline, respectively (Table 2). Disease activity was evaluated using DAS28-CRP and DAPSA28 scores, as well as ACR response. DAS28-CRP values decreased from 4.17 ± 1.07 to 2.78 ± 1.23 at month 3, 2.07 ± 0.75 at month 6, and 2.17 ± 0.97 at month 9, indicating a reduction in disease activity. Remission and low disease activity were determined in 72.0% and 13.3% of patients at the final visit, respectively (Table 3). Moreover, according to the DAPSA28 classification, the high disease activity observed at baseline decreased from 53.23 ± 51.55 to 22.92 ± 22.11 at month 3, 13.43 ± 10.64 at month 6, and 16.49 ± 17.26 at month 9. Remission and low disease activity were determined in 18.67% and 45.33% of patients at the final visit, respectively (Table 3). In addition to these results, ACR20/50/70 responses were improved, to 86.8%, 63.7%, and 41.8% of patients, at the month-9 final visit (Table 3).

Discussion

PsA is a progressive inflammatory disease that causes loss of function and health-related QoL and negatively affects work productivity [3]. Recent clinical trials have planned to determine the effect of anti-TNF treatment on work disability in rheumatic diseases—especially comparing different classes of drug treatments [6]. Numerous studies showed that remission or low disease activity were the main accomplishable results in patients with PsA treated with anti-TNF [3, 18].

Significant improvements in symptoms of PsA were revealed with anti-TNF treatments in several studies. Moreover, clinical trials and observational studies conducted over 10 years showed the effectiveness of anti-TNF agents in all PsA-related outcomes, mainly in peripheral joint involvement [3]. For instance, infliximab significantly decreased pain and function and improved QoL, assessed using HAQ-DI, in patients with PsA with 24 weeks of treatment [25]. Similarly, another anti-TNF agent, adalimumab, also had better impacts on pain and QoL in patients with PsA [26, 27]. For example, in the ACCLAIM study, a statistically significant improvement of − 0.44 ± 0.53 points in the mean HAQ-DI score was observed at the 12th week compared with baseline [27]. Additionally, work disability decreased in response to adalimumab treatments in employed patients at the end of the 12-week period [26, 27]. Similar results were obtained in the GO-REVEAL trial [28]. The function, health-related QoL, and work productivity results revealed improvements in patients with PsA treated with golimumab for 24 weeks. HAQ-DI values and work disability significantly decreased with golimumab treatment [28]. Furthermore, another anti-TNF agent, certolizumab pegol, improved

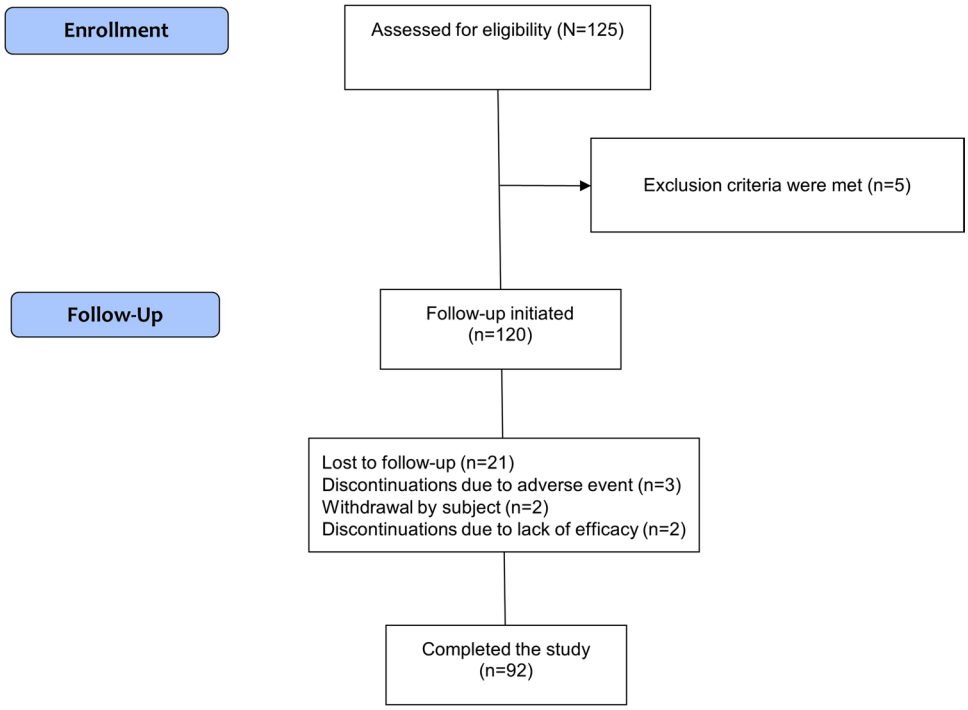

Fig. 1 Study flowchart

HAQ-DI scores and pain and fatigue results of patients with PsA over a 24-week period in the RAPID-PsA trial [29]. However, real-world data showing the impact of anti-TNF, especially on work productivity in patients with PsA, in the literature is scarce. Our results indicate reduced pain and fatigue in the 9-month period and significant improvement in work productivity and functional impairment in a cohort of patients with PsA receiving anti-TNF treatment in the real-world setting.

Several trials and observational studies conducted in recent years confirmed the efficiency of infliximab on the reduction of the SJCs and TJCs, with an ACR50 response ranging between 40 and 53% [30, 31]. The SJCs and TJCs were reduced to 58.0% and 54.1%, respectively, in the IMPACT-2 trial [31]. Similar results were obtained with etanercept therapy. ACR20/50/70 responses were 73%, 50%, and 13% with a 12-week treatment period [32]. Golimumab use also improved the ACR20 response significantly. In addition, there was no significant difference in the ACR20 response of patients using methotrexate as a concomitant medication, suggesting the efficiency of golimumab with or without concomitant methotrexate [33]. In the RAPID-PsA trial, certolizumab pegol provided improvements in the ACR response of patients with PsA. At the end of the 4-week period, an ACR20 response was achieved by 56.3% of patients, as well as ACR50 and ACR70 responses being achieved by 40.0% and 23.7% of patients, respectively [34]. Similarly, our results also suggested an improvement in the ACR response.

Dactylitis and enthesitis were previously defined as efficiency criteria for anti-TNF agents [3]. The improvement of dactylitis was shown in the ACCLAIM study with adalimumab, in the PRESTA study with etanercept, in the IMPACT-1 and 2 trials with infliximab, in the GO-REVEAL trial with golimumab, and in the RAPID-PsA trial with certolizumab [27, 30, 31, 33–35]. In addition, enthesitis was improved in 81.3% of patients with etanercept therapy in the PRESTA study [35]. Similarly, in the RAPID-PsA trial, enthesitis scores significantly decreased by − 1.8 with certolizumab compared with patients receiving placebo [34]. In our study, dactylitis and enthesitis results support the literature, as scores decreased significantly after 9 months of treatment compared with baseline.

We determined disease activity using DAS28-CRP and DAPSA28 scores and obtained significant remission and low disease activity levels. Remission and low disease activity values reached 72.0% and 13.3%, respectively, after 9 months, indicating the improvement in joints and pain. DAPSA is a measure of articular disease in PsA; for this reason, we used it for the calculation of the disease activity of patients with PsA [4]. We used DAPSA28 score with 28-joint counts instead of 66/68 joint counts in this study. Since DAPSA28 is also apprehended as an evaluation criterion with correlational and construct validity and sensitivity to change, herewith we propose to use it to calculate a modified DAPSA score, especially in patients with low disease activity [15, 16]. In this study, DAPSA28 scores showed an improvement in patients with PsA. These results also show improved low disease activity status.

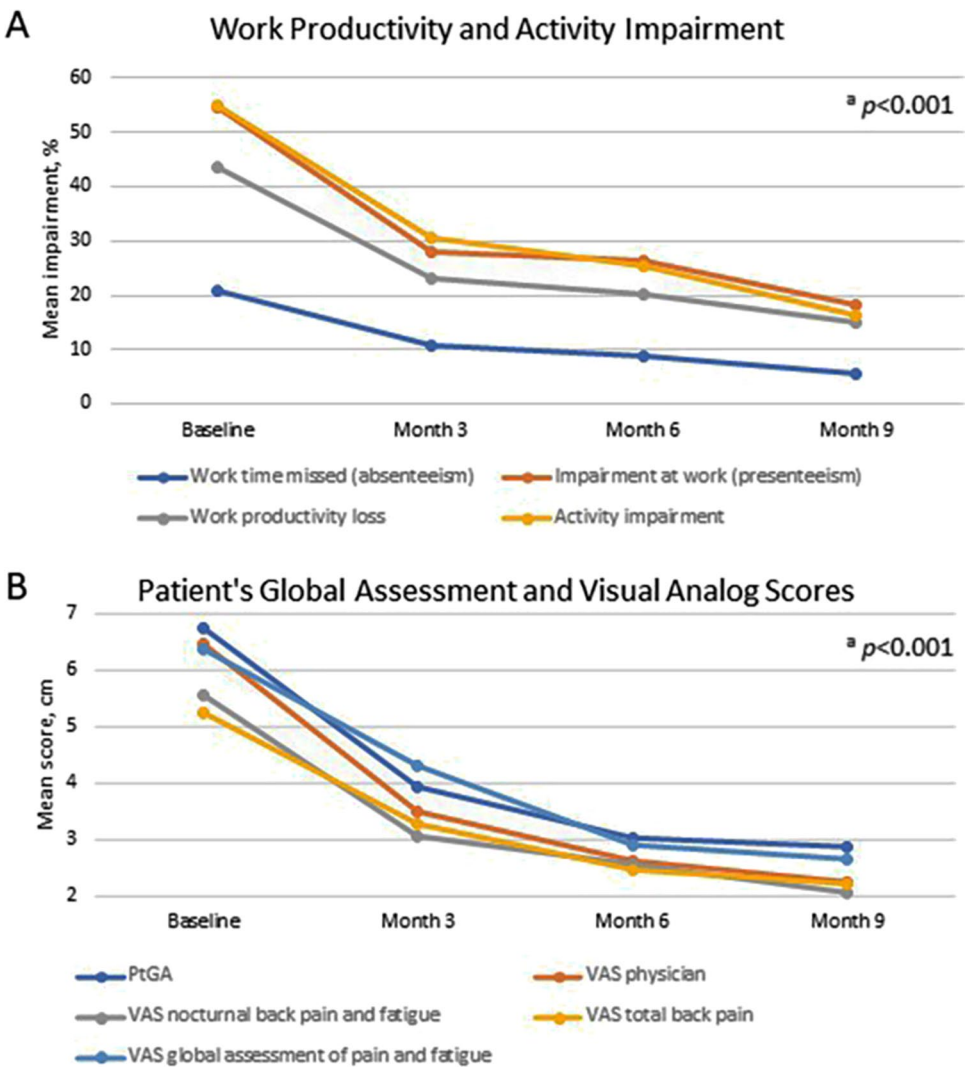

Fig. 2 Mean Work Productivity and Activity Impairment scores, PtGA, and VASs. PtGA, patient's global assessment; VAS, visual analog scale. [a]*p* values are the result of Friedman's test; however, they are also valid for pairwise comparisons: baseline versus month-3, baseline versus month-6, baseline versus month-9 comparisons for all parameters

Table 2 Clinical and patient-reported outcomes and disease activity indicators of patients over time

Outcome	Baseline	Month 3	Month 6	Month 9	*p* value[a]
HAQ-DI	1.73 ± 0.50 (120)	1.24 ± 0.65 (118)	1.15 ± 0.63 (114)	1.08 ± 0.59 (107)	< 0.001
CRP value (mg/L)	19.73 ± 48.06 (118)	5.89 ± 10.20 (93)	4.95 ± 7.85 (85)	6.46 ± 11.99 (82)	< 0.001
ESR value (mm/h)	26.64 ± 18.63 (115)	14.71 ± 12.23 (96)	14.28 ± 12.32 (87)	15.65 ± 12.94 (84)	< 0.001
Swollen joint count	4.91 ± 4.88 (120)	1.99 ± 3.78 (97)	0.39 ± 0.87 (90)	0.54 ± 1.38 (84)	< 0.001
Tender joint count	7.91 ± 6.85 (120)	3.67 ± 5.61 (96)	1.38 ± 2.41 (90)	1.92 ± 4.14 (84)	< 0.001
DAS28-CRP	4.17 ± 1.07 (118)	2.78 ± 1.23 (86)	2.07 ± 0.75 (79)	2.17 ± 0.97 (75)	< 0.001
DAPSA28	53.23 ± 51.55 (118)	22.92 ± 22.11 (86)	13.43 ± 10.64 (79)	16.49 ± 17.26 (75)	< 0.001
Enthesitis score	1.75 ± 2.37 (119)	0.60 ± 1.50 (103)	0.19 ± 0.76 (96)	0.45 ± 1.50 (88)	< 0.001
Dactylitis score	0.47 ± 1.01 (118)	0.15 ± 0.60 (103)	0.06 ± 0.43 (95)	0.03 ± 0.24 (88)	< 0.001

Abbreviations: *CRP*, C-reactive protein; *DAPSA28*, Disease Activity Index for Psoriatic Arthritis with 28 joints; *DAS28*, 28-joint Disease Activity Score; *ESR*, erythrocyte sedimentation rate; *HAQ-DI*, Health Assessment Questionnaire-Disability Index; *SD*, standard deviation

All values are presented as mean ± SD (*n*)

[a]*p* values are the result of Friedman's test; however, they are also valid for pairwise comparisons: baseline versus month-3, baseline versus month-6, baseline versus month-9 comparisons for all parameters

Table 3 Improvement in clinical scores according to ACR response criteria and decrease in disease activity by DAS28-CRP and DAPSA28 categories

Scoring tool	Baseline ($n=118$)	Month 3 ($n=86$)	Month 6 ($n=79$)	Month 9 ($n=75$)
ACR response criteria				
ACR20 achieved				79 (86.8)
ACR50 achieved				58 (63.7)
ACR70 achieved				38 (41.8)
DAS28				
Response by DAS28-CRP (≤ 2.6) as remission	8 (6.78)	44 (51.16)	57 (72.15)	54 (72.00)
Response by DAS28-CRP (>2.6 to ≤ 3.2) as low disease activity	10 (8.47)	14 (16.28)	15 (18.99)	10 (13.33)
DAPSA28				
Response by DAPSA28 (≤ 4) as remission	0	9 (10.47)	9 (11.39)	14 (18.67)
Response by DAPSA28 (>4 to ≤ 14) as low disease activity	3 (2.54)	28 (32.56)	45 (56.96)	34 (45.33)

Abbreviations: *ACR20/50/70*, 20%/50%/70% improvement in American College of Rheumatology response criteria; *DAPSA28*, Disease Activity Index for Psoriatic Arthritis with 28 joints; *DAS28-CRP*, 28-joint Disease Activity Score using C-reactive protein

All values are presented as *n* (%)

There is high percentage of female patients in this cohort. However, the rates are similar to the registry results from Turkey where around 64% of the patients were female [36]. The same study also showed worse outcomes of female patients compared to the male patients at the same objective disease activity. Another literature showed that female psoriasis and psoriatic arthritis patients were 1.47 times more likely to seek care [37]. As a result, closer follow-up requirements of women compared with men may be seen given the higher unmet need in women. This could explain why women are more frequently recruited. This is also supported by a recent inception cohort study from the same registry which included fewer women than the established group (57% versus 66.8%) [38].

It is important to highlight certain methodologic limitations of the study. Given the observational design of the study, the inability to control concomitant treatment modalities limited the assessment of the exact response to anti-TNF agents and head-to-head comparison with other treatment modalities which could better be assessed in a randomized trial. Another limitation is the high dropout rate; the most common reason was "lost to follow-up" and those patients were not replaced because this was a noninterventional observational study. Because all patients with PsA who were to receive anti-TNF treatment were enrolled, there could be a patient selection bias. Patients who continued with anti-TNF treatment were more likely to achieve an adequate treatment response compared with those who discontinued treatment, which may also bias the results. The inclusion of patients who were on an anti-TNF agent at any time instead of the initiation of the treatment is another limitation of the study.

The data from our real-world study showed improvement in work productivity, clinical outcomes, and PROs in patients with PsA receiving anti-TNF treatment. Work disability, functional impairment, QoL, and clinical outcomes improved significantly in response to therapy despite the initial high disease activity. Our results may also suggest that work disability may improve upon reaching remission or low disease activity after efficient treatment of PsA. However, prospective studies should be conducted to determine the effects of anti-TNF agents on work productivity loss in patients with PsA.

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Data availability Data are available upon reasonable request.

Code availability Not applicable.

Declarations

Ethics approval This study was approved by the Clinical Research Ethics Committee of Hacettepe University on October 31, 2013, with an approval number: 2013/13–03 (KA-130083).

Consent to participate Written informed consent was received before enrolment from all participants.

Consent to publication Not applicable.

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