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ORIGINAL ARTICLE

Assessment of fatigue in patients with rheumatoid arthritis using the Functional Assessment of Chronic Illness Therapy–Fatigue (FACIT-F) scale

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ABSTRACT

Aim To assess fatigue severity in patients with rheumatoid arthritis (RA) using the Functional Assessment of Chronic Illness Therapy-Fatigue (FACIT-F) scale and to examine its association with demographic, socioeconomic, clinical, and lifestyle-related factors.

Methods This cross-sectional observational study included 90 adults with RA. Fatigue was assessed using the FACIT-F scale, and disease activity was assessed using the Disease Activity Score in 28 joints (DAS28). Continuous variables were summarised as medians and interquartile ranges (IQRs). Associations were evaluated using Spearman correlation, Mann-Whitney U, Kruskal-Wallis, and robust linear regression analyses.

Results The median FACIT-F score was 37.0 [IQR 27.0 – 45.0], and 35.6% of patients had moderate-to-severe fatigue. FACIT-F correlated negatively with DAS28 ($\rho = -0.381$; $p < 0.001$). In multivariable robust regression, DAS28 remained associated with FACIT-F score after adjustment for age and disease duration ($\beta = -3.54$; 95% confidence interval −5.39 to −1.68; $p < 0.001$), whereas age and disease duration were not significant. FACIT-F scores differed by sex and employment status but not by treatment category.

Conclusion Fatigue is a prevalent and clinically important symptom in RA. Higher disease activity was associated with greater fatigue severity, supporting comprehensive assessment of fatigue beyond inflammatory disease activity alone.

Keywords: arthritis, rheumatoid, fatigue, patient-reported outcome measures, severity of illness index

INTRODUCTION

Rheumatoid arthritis (RA) is a common autoimmune disease characterised by chronic, symmetrical, and progressive polyarthritis (1). In addition to joint inflammation, patients frequently experience systemic manifestations that substantially affect daily functioning and quality of life. Among these, fatigue is one of the most prevalent and burdensome symptoms reported by patients with RA (2).

Fatigue in RA is typically described as a persistent sense of physical and/or mental exhaustion that is not fully relieved by rest (3). It affects multiple aspects of patients' lives, interfering with activities of daily living, work productivity, and social participation. Many patients rank fatigue among the most disabling features of the disease, often considering it comparable to pain in terms of its impact on overall well-being (4).

Despite its clinical importance, fatigue has historically received less attention in routine clinical practice than traditional indicators of inflammatory disease activity, such as synovitis or joint damage. Patients, however, frequently emphasise the need for a broader approach to disease management that also addresses fatigue, pain, sleep disturbance, and other quality-of-life domains (2).

Several studies have identified multiple factors associated with fatigue in RA, including pain intensity, physical disability, impaired general health status, reduced physical activity, and comorbid conditions (5). These findings support the concept

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that fatigue in RA is a multidimensional symptom influenced by both biological and psychosocial mechanisms.

The Functional Assessment of Chronic Illness Therapy-Fatigue (FACIT-F) questionnaire is a validated patient-reported outcome instrument that measures fatigue and its impact on daily functioning in individuals with chronic diseases. The scale was originally developed for patients with cancer and anaemia and has subsequently been validated for use in RA populations (6). FACIT-F assesses fatigue severity and its effects on physical, emotional, functional, and social well-being over the previous seven days, with lower scores indicating greater fatigue severity. Although fatigue has been extensively studied in RA, data from Bosnia and Herzegovina and the wider Western Balkan region remain limited. To our knowledge, this is the first study evaluating fatigue in patients with RA in Bosnia and Herzegovina using the FACIT-F questionnaire.

The aim of this study was to assess fatigue severity in patients with RA using the FACIT-F questionnaire and to examine its association with selected demographic, socioeconomic, clinical, and lifestyle-related factors.

MATERIAL AND METHODS

Patients and study design

This cross-sectional observational study was conducted at the Department of Rheumatology, University Clinical Centre Tuzla, between January and March 2026. Consecutive adult patients (≥ 18 years) with a confirmed diagnosis of RA according to the 2010 American College of Rheumatology/European League Against Rheumatism classification criteria were screened for eligibility during routine outpatient visits.

A total of 100 patients were initially assessed for participation. Ten patients were excluded because conditions known to significantly influence fatigue were present, including acute infection, active malignancy, clinically significant anaemia (haemoglobin < 100 g/L), or advanced organ failure. Fatigue-related comorbidities were systematically screened at enrolment through medical history, review of medical records, and clinical assessment. The final study population consisted of 90 patients.

An a priori sample size calculation was performed for the primary analysis, defined as the correlation between FACIT-F and the Disease Activity Score in 28 joints (DAS28). Assuming a moderate correlation (r = 0.30), a two-sided significance level of 0.05, and 80% power, the required minimum sample size was 85 evaluable patients. Allowing for approximately 10% exclusions or incomplete data, a target recruitment of 95–100 patients was planned.

The study protocol was approved by the Ethics Committee of the University Clinical Centre Tuzla (Decision date: 28 January 2026; Decision No. 02-09/2-193-3/25), and all participants provided written informed consent.

Methods

Fatigue severity was assessed using the validated FACIT-F scale, a 13-item patient-reported outcome instrument that evaluates fatigue and its impact on daily functioning during the previous seven days. Each item is scored from 0 (not at all) to 4 (very much). After reverse-scoring selected items, total scores range from 0 to 52, with lower scores indicating greater fatigue severity. Fatigue was categorised according to previously published FACIT-F severity bands: none or minimal (> 40), mild (> 30 to ≤ 40), moderate (>21 to ≤ 30), and severe (≤ 21) (6,7).

The officially licensed Bosnian version of the FACIT-F scale was used with permission from FACIT.org. The questionnaire was self-administered during the outpatient visit, with investigator assistance provided when needed to ensure comprehension.

Disease activity was assessed using DAS28, which incorporates tender and swollen joint counts, patient-reported global health on a visual analogue scale, and erythrocyte sedimentation rate (ESR) (8). Joint counts and clinical assessments were performed by trained rheumatologists as part of routine clinical evaluation. ESR was measured on the same day as the clinical assessment. The primary outcome was fatigue severity measured using the FACIT-F total score. Demographic, socioeconomic, clinical, and lifestyle-related data were collected through review of medical records and structured patient interviews at enrolment.

Statistical analysis

Statistical analyses were performed using R version 4.6.1 (R Foundation for Statistical Computing, Vienna, Austria). Continuous variables were summarised as medians and interquartile ranges (IQRs), whereas categorical variables were presented as numbers and percentages. Normality was assessed using the Shapiro–Wilk test. Because most variables were not normally distributed, non-parametric methods were applied. Associations between continuous variables were evaluated using Spearman rank correlation. Differences between two independent groups were analysed using the Mann–Whitney U test, and comparisons among three or more independent groups were assessed using the Kruskal–Wallis test. When the Kruskal–Wallis test was significant, post hoc pairwise comparisons were performed using Dunn's test with Bonferroni correction. The primary multivariable analysis evaluated the association between DAS28 and FACIT-F score after adjustment for the predefined clinical covariates age and disease duration. A parsimonious model was selected because of the modest sample size; sex, employment status, and other demographic, socioeconomic, and lifestyle-related variables were examined separately in univariable analyses. Robust linear regression was used because it is less sensitive than ordinary least-squares regression to influential observations. Model diagnostics included assessment of residual distribution and influential observations using Cook's distance. Statistical significance was defined as $p < 0.05$.

RESULTS

A total of 90 patients with RA were included in the final analysis, of whom 75 (83.3%) were women. Most participants were non-smokers, 62 (68.9%), and secondary education was the most common educational level, reported by 54 (60.0%) participants. The median age was 60.0 years (IQR 49.0–65.0) (Table 1).

The median DAS28 score was 4.62 (IQR 3.82–5.37), and the median disease duration was 8.5 years (IQR 3.0–17.0). According to DAS28 categories, four (4.4%) patients were in remission, eight (8.9%) had low disease activity, 50 (55.6%) had moderate disease activity, and 28 (31.1%) had high disease activity (Table 2).

The median FACIT-F score was 37.0 (IQR 27.0–45.0). Based on FACIT-F categories, 37 (41.1%) participants had minimal fatigue, 21 (23.3%) had mild fatigue, 23 (25.6%) had moderate fatigue, and nine (10.0%) had severe fatigue. Overall, 32 (35.6%) participants had moderate-to-severe fatigue.

Table 1. Sociodemographic characteristics of the study population

Variable	Value
	Median (IQR)
Age (years)	60.0 (49.0–65.0)
	N (%)
Sex	
Female	75 (83.3)
Male	15 (16.7)
Employment status	
Unemployed	43 (47.8)
Employed	36 (40.0)
Retired	11 (12.2)
Smoking status	
Non-smoker	62 (68.9)
Smoker	28 (31.1)
Education level	
Primary education	24 (26.7)
Secondary education	54 (60.0)
University degree	12 (13.3)

IQR, interquartile range.

Table 2. Clinical characteristics of the study population

Variable	Value
	Median (IQR)
DAS28 score	4.62 (3.82–5.37)
Disease duration (years)	8.5 (3.0–17.0)
	N (%)
Disease activity	
Remission	4 (4.4)
Low activity	8 (8.9)
Moderate activity	50 (55.6)
High activity	28 (31.1)
Treatment category	
csDMARD	45 (50.0)
bDMARD	13 (14.4)
tsDMARD	4 (4.4)
csDMARD + bDMARD	4 (4.4)
csDMARD + tsDMARD	3 (3.3)
Glucocorticoids only	13 (14.4)
No therapy	8 (8.9)

bDMARD, biologic disease-modifying antirheumatic drug; csDMARD, conventional synthetic disease-modifying antirheumatic drug; DAS28, Disease Activity Score in 28 joints; tsDMARD, targeted synthetic disease-modifying antirheumatic drug.

Table 3. Spearman correlations of FACIT-F score with age, disease duration, and DAS28

Variable	ρ	p
Age	0.023	0.829
Disease duration	0.001	0.926
DAS28 score	−0.381	<0.001

DAS28, Disease Activity Score in 28 joints; FACIT-F, Functional Assessment of Chronic Illness Therapy-Fatigue; ρ, Spearman correlation coefficient.

The Shapiro–Wilk test showed non-normal distributions for age, disease duration, and FACIT-F score ($p < 0.05$), whereas DAS28 followed a normal distribution ($p = 0.895$).

Spearman correlation analysis showed a significant negative correlation between FACIT-F and DAS28 scores ($\rho = -0.381$; $p < 0.001$). FACIT-F score was not correlated with age ($\rho = 0.023$; $p = 0.829$) or disease duration ($\rho = 0.001$; $p = 0.926$) (Table 3).

In multivariable robust linear regression, DAS28 was associated with FACIT-F score after adjustment for age and disease duration ($\beta = -3.54$; 95% confidence interval −5.39 to −1.68; $p < 0.001$). Thus, each one-unit increase in DAS28 corresponded to an average decrease of approximately 3.5 points in FACIT-F score. Age and disease duration were not significantly associated with FACIT-F score (Table 4).

FACIT-F scores were significantly higher in male than female participants, with median scores of 45.0 (IQR 39.5–49.5) and 35.0 (IQR 25.0–44.0), respectively ($p = 0.002$). Scores did not differ by smoking status ($p = 0.327$) or marital status ($p = 0.884$). A significant difference was observed across employment categories ($p = 0.014$): median scores were 43.0 (IQR 35.5–47.3) for employed, 33.0 (IQR 24.0–40.0) for unemployed, and 36.0 (IQR 29.5–44.0) for retired participants. Dunn's post hoc test with Bonferroni correction showed significantly higher scores in employed than unemployed participants ($p = 0.011$). FACIT-F scores also differed across educational levels ($p = 0.040$), with medians of 27.5 (IQR 22.0–38.3) for primary education, 39.0 (IQR 31.3–45.8) for secondary education, and 45.0 (IQR 28.3–46.0) for university education; however, no pairwise comparison remained significant after correction for multiple testing. Scores did not differ across treatment categories ($p = 0.404$) (Table 5).

DISCUSSION

This study showed that fatigue was common among patients with RA, with more than one-third reporting moderate-to-severe fatigue. Higher disease activity remained associated with greater fatigue after adjustment for age and disease duration, whereas age and disease duration were not significant. FACIT-F scores also differed by sex and employment status. These findings are consistent with previous studies describing substantial and persistent fatigue burden in RA (9–11).

Sex-related differences in fatigue have been described in several studies, with female patients generally reporting higher levels of fatigue. These differences have been attributed to variations in pain perception, hormonal influences, and psychosocial factors (12,13). In the present study, FACIT-F scores differed significantly between sexes, with male patients reporting lower fatigue levels. However, this finding should be interpreted with caution because the study population was predominantly female and the number of male participants was relatively small.

A significant difference in fatigue severity was also observed across employment categories. Employed patients had higher FACIT-F scores, indicating lower fatigue levels than unemployed participants. These findings are consistent with previous research showing that individuals with lower socioeconomic status often experience poorer disease outcomes and greater symptom burden, including fatigue (14–16). Limited access to healthcare resources, reduced health literacy, and increased psychosocial stress may partly explain these associations.

The absence of an association between smoking status and fatigue severity in our study is consistent with the multifactorial nature of fatigue in RA, which suggests that smoking may play a more prominent role in disease pathogenesis and structural

Table 4. Univariable and multivariable robust linear regression analyses of FACIT-F score

	Univariable analysis		Multivariable analysis	
Predictor	**β (95% CI)**	p	**β (95% CI)**	p
DAS28 score	−3.58 (−5.43 to −1.73)	<0.001	−3.54 (−5.39 to −1.68)	<0.001
Age	−0.08 (−0.28 to 0.12)	0.418	−0.05 (−0.24 to 0.14)	0.580
Disease duration	0.01 (−0.26 to 0.27)	0.964	−0.01 (−0.27 to 0.25)	0.930

CI, confidence interval; DAS28, Disease Activity Score in 28 joints; FACIT-F, Functional Assessment of Chronic Illness Therapy-Fatigue; β, regression coefficient.

Table 5. Differences in Functional Assessment of Chronic Illness Therapy-Fatigue (FACIT-F) scores across sociodemographic and treatment-related categories

Variable	FACIT-F score	p
	Median (IQR)	
Sex		0.002
Female	35.0 (25.0–44.0)	
Male	45.0 (39.5–49.5)	
Smoking status		0.327
Smoker	40.5 (26.5–48.3)	
Non-smoker	37.0 (27.3–44.8)	
Marital status		0.884
Married	38.0 (28.5–45.0)	
Widowed	32.0 (22.0–48.3)	
Single	40.0 (37.0–43.0)	
Divorced	35.0 (35.0–35.0)	
Employment status		0.014
Employed	43.0 (35.5–47.3)	
Unemployed	33.0 (24.0–40.0)	
Retired	36.0 (29.5–44.0)	
Educational level		0.040
Primary education	27.5 (22.0–38.3)	
Secondary education	39.0 (31.3–45.8)	
University degree	45.0 (28.3–46.0)	
Treatment category		0.404
csDMARD	36.0 (26.0–43.0)	
bDMARD	45.0 (31.0–46.0)	
tsDMARD	35.0 (27.5–42.5)	
csDMARD + bDMARD	39.0 (32.8–40.5)	
csDMARD + tsDMARD	40.0 (37.0–42.5)	
Glucocorticoids only	44.0 (32.0–50.0)	
No therapy	28.0 (21.8–39.0)	

IQR, interquartile range; bDMARD, biologic disease-modifying antirheumatic drug; csDMARD, conventional synthetic disease-modifying antirheumatic drug; tsDMARD, targeted synthetic disease-modifying antirheumatic drug.

damage than in directly influencing perceived fatigue levels.

A moderate negative correlation was observed between FACIT-F and DAS28 scores, indicating that higher disease activity was associated with greater fatigue severity. In the multivariable model adjusted for age and disease duration, each one-unit increase in DAS28 corresponded to an approximately 3.5-point decrease in FACIT-F score. Similar associations between disease activity, pain, and fatigue have been reported previously (5). Fatigue in RA is widely recognised as a multifactorial phenomenon involving biological, psychological, and social factors (17). Previous studies have identified pain, sleep disturbance, depressive symptoms, reduced physical functioning, and comorbid conditions as important contributors to fatigue (7,18).

No significant association was observed between fatigue and age. This is consistent with reviews suggesting that age alone is not a reliable predictor of fatigue in RA (10,19). Disease duration was also not associated with fatigue severity. Previous research has shown that fatigue may persist across disease stages and may not resolve fully even with effective pharmacological treatment, further supporting its multifactorial nature (20,21).

Recent European Alliance of Associations for Rheumatology (EULAR) recommendations emphasise that fatigue management in inflammatory rheumatic and musculoskeletal diseases should combine optimal control of disease activity with non-pharmacological strategies, including physical activity and psychosocial support (22). A recent meta-analysis also found that structured exercise interventions can reduce fatigue in patients with RA, supporting integrated treatment strategies beyond pharmacotherapy alone (23).

This study has several limitations. The cross-sectional design prevents causal inference regarding the relationship between disease activity and fatigue severity, and the modest sample size from a single tertiary centre may limit generalisability. Although the sex distribution reflects the female predominance of RA, the small number of male participants limited sex-specific comparisons. Some treatment categories also contained relatively few patients, so treatment-related comparisons should be interpreted cautiously. The multivariable model was intentionally parsimonious and included DAS28, age, and disease duration; sex, employment status, and other demographic, socioeconomic, and lifestyle-related variables were analysed separately and were not included in the adjusted model to avoid overfitting. Several potentially important contributors to fatigue, including pain intensity, sleep disturbance, depressive and anxiety symptoms, body mass index, medication dosage, anaemia-related parameters, and comorbid conditions, were not systematically assessed. Residual confounding therefore cannot be excluded.

CONCLUSION

Fatigue is a common and clinically significant symptom in patients with RA. Higher disease activity was associated with greater fatigue severity. These findings support comprehensive assessment and management of fatigue beyond inflammatory disease activity alone.

FUNDING

No specific funding was received for this study.

CONFLICTS OF INTEREST:

None to declare.

ETHICS STATEMENT

Written informed consent was obtained from all participants prior to enrolment in the study. The study protocol was approved

by the Ethics Committee of the University Clinical Centre Tuzla and conducted in accordance with the principles of the Declaration of Helsinki (Decision date: 28 January 2026; Decision No. 02-09/2-193-3/25).

DATA AVAILABILITY STATEMENT

The data supporting the findings of this study are available from the corresponding author upon reasonable request and with permission of the institution.

AUTHOR CONTRIBUTIONS (CRediT)

Conceptualization: M.S.J.; **Data curation:** M.S.J., N.K., A.S. T., A.T. M., A.I., H.B.; **Formal analysis:** N.K., A.S. T., N.Č.; **Investigation:** M.S.J., A.T. M., A.I., H.B.; **Methodology:** M.S.J., M.S., A.T. M., N.D.; **Project administration:** M.S.J., M.S.; **Software:** N.K., N.Č.; **Supervision:** M.S.J., M.S., E.B., M.B.; **Validation:** M.S., E.B., M.B.; **Visualization:** M.S.J., A.S. T., A.I., N.D.; **Writing – original draft:** M.S.J.; **Writing – review & editing:** M.S.J., M.S., E.B. All authors have read and agreed to the published version of the manuscript.

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