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Assessment of loneliness in patients with inflammatory arthritis

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Abstract

Aim: This study aimed to explore loneliness and associated factors in Turkish patients with inflammatory arthritis.

Method: Adult patients with rheumatoid arthritis (RA) (n = 58), ankylosing spondylitis (AS) (n = 53), and psoriatic arthritis (PsA) (n = 30), respectively, were included in the study. A single-item visual analog scale (VAS) for loneliness, UCLA Loneliness Scale-8 (ULS-8), Beck depression inventory (BDI), Beck anxiety inventory (BAI), revised multidimensional scale of perceived social support, Health Assessment Questionnaire-Disability Index (HAQ-DI) were used for the psychometric and functional assessments. Multiple regression models were generated for predicting the ULS-8 and HAQ-DI scores.

Results: There was no difference between disease groups in terms of the ULS-8 and HAQ-DI scores. Among demographic and clinical parameters, only the education status and number of drugs used had associations with the ULS-8 score. Single-item VAS score for loneliness did not predict the ULS-8 score well. There were significant correlations between the ULS-8 and HAQ-DI, depression, anxiety, social support, and physician global VAS scores. Only the education status significantly predicted ($\beta = -0.208$) the ULS-8 score in multiple regression analysis (adjusted $R^2 = 0.15$, $P < .001$). Beck depression, anxiety, and patient global VAS scores remained significant for predicting the HAQ-DI after multiple regression with the covariates ULS-8, depression, anxiety, social support, patient and physician global VAS scores, and the number of drugs used (adjusted $R^2 = 0.53$, $P < .001$). Disease activity and the ULS-8 scores were not found to be associated in any disease group.

Conclusion: Loneliness is associated with depression, anxiety, lack of social support, disability, higher number of drugs used, and lower education but not with disease activity in Turkish patients with RA, AS, and PsA. Perception and expression of loneliness vary according to the cultural background. Single-item scales for loneliness may lack reliability compared to the more comprehensive ULS-8.

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KEYWORDS
ankylosing spondylitis, inflammatory arthritis, loneliness, psoriatic arthritis, rheumatoid arthritis, social support

1 | INTRODUCTION

The biopsychosocial model examines how biological, psychological, and social aspects play a role in health and disease models. It is proposed to allow doctors to better grasp the emotional perspective of their patients on their disease and suffering.[1] Social aspects have usually been neglected not only in clinical practice but in research on rheumatic diseases.

Loneliness, defined as the painful emotional experience of a disparity between the real and the desired social contact,[2] may be one of the most overlooked aspects of the social domain and is associated with a negative self-assessment of health.[3,4] While it is closely related to other social issues such as lack of support, invalidation, and isolation, loneliness has also affective, cognitive, and behavioral correlates.[5,6] Most of the medical literature on loneliness has concentrated mainly on mental health and related issues.[5,7] Loneliness has been found to be inversely correlated with life satisfaction and associated with poor personality integration.[5] It has also been linked to anxiety and depression in numerous empirical investigations.[5,8,9] Loneliness may predict depression and may even be a vulnerability factor for suicide ideation, parasuicide, and suicide completion.[5,10] In addition to suicide risk, studies have found loneliness to be associated with alcohol abuse.[11] Moreover, as a risk factor for both mental and physical health problems,[12] it shows a harmful effect on all-cause mortality as well.[13] Loneliness may indicate an excess mortality risk even after control for age, gender, and subjective health in the elderly.[4] Studies also demonstrated the negative effects of loneliness on survival after myocardial infarction,[7] metastatic breast cancer,[14] and malignant melanoma.[15]

The impact of loneliness on rheumatic diseases (and vice versa) is largely unknown. Patients with inflammatory arthritis identified loneliness as a contributor to psychological distress.[16] In a study conducted in patients with rheumatoid arthritis (RA), ankylosing spondylitis (AS), osteoarthritis, other systemic rheumatic diseases, and fibromyalgia, lack of social support and invalidation were identified as the independent predictors of loneliness.[17] Of note, neither of these two studies explored clinical features of the disease and their association with loneliness. Further, they had mixed patient groups including those with inflammatory and degenerative rheumatic diseases and subgroups of inflammatory arthritis were not individually examined. Interestingly, when loneliness was explored in a cross-cultural context in RA, female Egyptian RA patients were found to experience more loneliness than Dutch patients.[18] However, low social support was important in explaining loneliness in the Netherlands but not in Egypt. In terms of disease-related features, this study examined only the disease duration and disability in relation to psychosocial factors and loneliness, and recruited RA patients only. Loneliness appears to share common features across cultures, yet culture shapes it and is shaped by it.[19] So, loneliness and culture are conceptually interrelated.[19] Perception and expression of loneliness and coping with it are all known to vary according to the cultural background.[19,20]

The origin of loneliness has been a focus of discussion. Some proposed a single-dimension view that loneliness was a core perception of an individual not primarily dependent on the changing relationships and felt in the same way by all lonely people.[2,21,22] Others proposed emotional (further divided into romantic and family categories) and social origins.[2,21] Thus, the measurement of loneliness by single- or multidimensional approaches has long been argued.[21] Single-item Likert-type or visual analog scales (VAS), multi-item single-dimensional scales (such as UCLA [University of California, Los Angeles] Loneliness Scale), and multidimensional scales composed of emotional and social sub-scales (such as Social and Emotional Loneliness for Adults [SELSA]) were used to explore loneliness in studies.[2-5,17,18,21,22]

Our study aims to explore loneliness and associated factors in patients with RA, AS, and psoriatic arthritis (PsA) with a focus on disease-related factors. Effects of demographic features, functional status, depression, anxiety, and social support on loneliness, and loneliness on functional status will also be evaluated. Since very little is known about loneliness in inflammatory arthritis and as loneliness is to be shaped by the culture, our study will contribute to the literature in the context of Turkish culture in which social bonds are expected to be strong. It is also expected to highlight loneliness and its predictors, increase awareness, and finally guide potential future interventions in the study population.

2 | METHODS

2.1 | Patients and design

Patients, 18 years of age or older, with RA, AS, and PsA, meeting the 2010 American College of Rheumatology/European League Against Rheumatism (ACR/EULAR)[23] modified New York criteria,[24] and Classification Criteria for Psoriatic Arthritis (CASPAR),[25] followed up at the Department of Rheumatology, Trakya University Hospital and admitted between May 2018 and December 2019, were included in the study. Sample size was determined using ClinCalc (www.clincalc.com/stats/samplesize.aspx) online statistics program. To detect 20% or more difference in the mean loneliness scores with 0.05 type I error and 80% power and when the standard deviations were set as 20% of the mean, at least 16 patients were found to be included in each study group. To decrease type II error, inclusion of at least 30 cases per study group was planned. Exclusion criteria were the presence of severe disease complications, comorbid diseases requiring hospitalization, and severe mental states that grossly affect cognition caused by disorders such as dementia, schizophrenia, and bipolar disorder.

2.1.1 | Demographic features

Age, gender, marital status, number of children, household size, education and working status, and comorbid diseases were determined.

2.1.2 | Clinical parameters

Disease duration, number of drugs being used, corticosteroid, non-steroidal anti-inflammatory and conventional or biological/targeted synthetic disease-modifying anti-rheumatic drug (DMARD) use, erythrocyte sedimentation rate (ESR), serum C-reactive protein (CRP), and the relevant disease activity indices were identified for each patient. The Disease Activity Score of 28 joints (DAS28), Clinical Disease Activity Index (CDAI), and Simplified Disease Activity Index (SDAI) were used to assess the disease activity in patients with RA.[26] The Bath AS Disease Activity Index (BASDAI), Bath AS Functional Index (BASFI), and AS Disease Activity Score (ASDAS) were used to assess the disease activity in AS patients.[27] For patients with PsA, the number of swollen and tender joints, and 0-100 point VAS for pain and fatigue were used as indicators of disease activity in addition to ESR and CRP since no single disease activity index is available. VAS (0-100 points) for the global assessment of health by the patients themselves and the relevant physicians were also used. Additionally, the presence of enthesitis and uveitis for AS, active psoriasis for PsA, and hand deformities (Boutonniere, swan-neck, Z-thumb deformities, radioulnar, radiocarpal, carpometacarpal, and metacarpophalangeal subluxations and deviations, and arthritis mutilans) for RA and PsA patients were recorded.

2.1.3 | Psychometric assessment

Beck depression inventory (BDI), Beck anxiety inventory (BAI), revised multidimensional scale of perceived social support, and UCLA loneliness scale (ULS-8), all validated in Turkish populations,[28-31] were used for psychometric assessments. A 0-10 point VAS for loneliness was tested for the prediction of the ULS-8 score. A significant correlation existed between the ULS-8 score and VAS score for loneliness ($\rho = 0.386$, $P < .001$). But only 11% of the variance in the ULS-8 score was explained by the VAS score (Appendix S1). Since the magnitude of effect of this simple one-item VAS score on the validated and comprehensive ULS-8 score was so small, it was not found useful for the assessment of loneliness in our sample.

2.1.4 | Functional assessment

Health Assessment Questionnaire-Disability Index (HAQ-DI) was used for the functional assessement.[32]

ULS-8 and HAQ-DI scores were the primary outcome variables and the relationship between the demographic, clinical and psychological features with ULS-8 and HAQ-DI was assessed in a cross-sectional way.

2.2 | Statistical analysis

Statistical analyses were performed using IBM SPSS Statistics for Windows, v.19 (IBM Corp., Armonk, NY, USA). Data were expressed as numbers and percentages for the categorical, and medians and interquartile ranges (IQRs) for the continuous variables because of the small sample size and mostly non-normal distribution. Normality was assessed by the Shapiro-Wilk test. Non-parametric comparison (Wilcoxon-Mann-Whitney and Kruskal-Wallis) and correlation (Spearman) tests were used to evaluate the association of the ULS-8 score with the demographic data, clinical parameters, and depression, anxiety, social support, and HAQ-DI scores. Categorical comparisons were performed using Chi-square or Fisher's exact tests. Two multiple regression models to predict HAQ-DI and ULS-8 scores were generated for significant associations and standardized β coefficients were provided. P values less than .05 were considered statistically significant. Adjusted significance levels were provided in post hoc pairwise comparisons for continuous variables and Bonferroni corrections were made for the categorical ones.

3 | RESULTS

3.1 | Patient characteristics and clinical features

After exclusion of 12 patients due to severe medical conditions, dementia, and unwillingness to participate in the study, 141 patients (58, 53, and 30 with RA, AS, and PsA, respectively) were recruited into the study. The demographic data and clinical features of the disease groups are summarized in Table 1. RA patients were older compared to AS and PsA patients, female gender was also more frequent in the RA group. Corticosteroid and conventional DMARD use were less frequent in AS compared to RA and PsA, as expected.

3.2 | Psychometric and functional evaluation and global health assessment of the study groups

Most patients had minimal to mild depression regardless of the disease group (Table 2). There were 18.9%, 15.1%, and 6.6% of the patients in the RA, AS, and PsA groups, respectively, who had moderate to severe depression. Similar was true for anxiety except moderate anxiety was more frequent in RA compared to the AS group (Table 2). Median ULS-8 scores were 15, 15, and 14.5 in the RA, AS, and PsA groups, respectively ($P = .749$). Social support scores

TABLE 1 Demographic data and clinical parameters according to disease groups

	RA (n = 58)	AS (n = 53)	PsA (n = 30)	*P* value
Age, y	58 (IQR 12)[a,b]	42 (IQR 14)[a,b]	45 (IQR 20)[a,b]	<.001
Female, n (%)	41 (70.7)[a,b]	19 (35.8)[a,b]	21 (70)[a,b]	<.001
Married, n (%)	46 (79.3)	46 (86.8)	28 (93.3)	.196
Number of children	2 (IQR 0)	2 (IQR 1)	2 (IQR 1)	.102
Household size	3 (IQR 2)	4 (IQR 1)	4 (IQR 1)	.057
Education status, n (%)				
Primary school or lower	33 (56.9)[a,b]	13 (24.5)[a,b]	14 (46.7)	.002[d]
Higher education	25 (43.1)[a,b]	40 (75.5)[a,b]	16 (53.3)	
Actively working, n (%)	16 (27.6)[a,b]	31 (58.5)[a,b]	10 (33.3)	.003[d]
Comorbid disease present,[c] n (%)	36 (62.1)[a,b]	19 (35.8)[a,b]	12 (40)	.014[d]
Number of drugs	5 (IQR 3)[a,b]	2 (IQR 1)[a,b]	5 (IQR 3)[a,b]	<.001[d]
Disease duration, y	8 (IQR 8)	9 (IQR 9)	9,5 (IQR 14)	.555
ESR, mm/h	25 (IQR 26)[a,b]	13 (IQR 15)[a,b]	19 (IQR 22)	.014[d]
CRP, mg/L	6 (IQR 8.8)	7,6 (IQR 9.3)	5,1 (IQR 6)	.396
Corticosteroid use, n (%)	42 (72.4)[a,b]	6 (11.3)[a,b]	24 (80)[a,b]	<.001
csDMARD use, n (%)	52 (89.7)[a,b]	16 (30.2)[a,b]	24 (80)[a,b]	<.001
b/tsDMARD use, n (%)	6 (10.3)[a,b]	37 (69.8)[a,b]	16 (53.3)[a,b]	<.001
NSAID use, n (%)				
No	19 (32.8)	11 (20.8)	9 (30)	.298
On demand	34 (58.6)	31 (58.4)	18 (60)	
Daily	5 (8.6)	11 (20.8)	3 (10)	

Note: Disease group, age, gender, education and working status, presence of comorbid disease, number of drugs, and ESR were controlled for each other.

Abbreviations: AS, ankylosing spondylitis; b/tsDMARD, biological or targeted synthetic disease-modifying anti-rheumatic drug; CRP, C-reactive protein; csDMARD, conventional synthetic disease-modifying anti-rheumatic drug; ESR, erythrocyte sedimentation rate; IQR, interquartile range; n, number; NSAID, non-steroidal anti-inflammatory drug; PsA, psoriatic arthritis; RA, rheumatoid arthritis.

[a,b]Denotes statistically significant pairs in the same row (post hoc adjusted $P < .05$).

[c]Psoriasis was excluded.

[d]No actual difference after control for the confounders.

were also similarly distributed among the groups (Table 2). There were 89.7%, 90.6%, and 96.7% of the patients in the RA, AS, and PsA groups who had mild disability (Table 2). The median patient VAS scores for the global assessment of health were 30 to 35/100 and the physician scores were 20 to 25/100 (Table 2).

3.3 | Loneliness and demographic and clinical features

The distributions of the ULS-8 score were similar across the categories of gender, marital and working status, presence of children, and comorbid disease. The median ULS-8 scores were 16.5 (IQR 6) and 14 (IQR 6) in primary school or lower and higher education categories of the education status, respectively ($P = .001$). Age, number of children, household size, number of comorbid diseases, disease duration, ESR, and serum CRP did not have a correlation with the ULS-8 score. The number of drugs used had a positive correlation with the ULS-8 score ($\rho = 0.22$, $P = .009$).

3.4 | Loneliness and psychometric and functional tests

The correlation matrix of the ULS-8, HAQ-DI, Beck depression, Beck anxiety, social support, and patient and physician global VAS scores are given in Table 3. The ULS-8 score had significant correlations with Beck depression ($\rho = 0.32$, $P < .001$), anxiety ($\rho = 0.33$,

TABLE 2 Psychometric test results, functional status, and patient and physician VAS scores for global disease assessment according to disease groups

	RA (n = 58)	AS (n = 53)	PsA (n = 30)	*P* value
Beck depression score	9 (IQR 13)	9 (IQR 11)	8.5 (IQR 11)	.924
Minimal depression, n (%)	41 (70.7)	37 (69.8)	22 (73.3)	.628
Mild depression, n (%)	6 (10.3)	8 (15.1)	6 (20)	
Moderate depression, n (%)	6 (10.3)	6 (11.3)	1 (3.3)	
Severe depression, n (%)	5 (8.6)	2 (3.8)	1 (3.3)	
Beck anxiety score	8.5 (IQR 16)	8 (IQR 13)	9.5 (IQR 10)	.626
Minimal anxiety, n (%)	30 (51.7)	31 (58.5)	17 (56.7)	.011
Mild anxiety, n (%)	15 (25.9)	16 (30.2)	9 (29.9)	
Moderate anxiety, n (%)	11 (19.9)[a]	1 (1.8)[a]	4 (13.4)	
Severe anxiety, n (%)	2 (3.5)	5 (9.5)	-	
Perceived social support score	67.5 (IQR 32)	72 (IQR 24)	77 (IQR 21)	.635
ULS-8 score	15 (IQR 7)	15 (IQR 5)	14.5 (IQR 7)	.749
HAQ-DI score	0.05 (IQR 0.45)	0.2 (IQR 0.58)	0.1 (IQR 0.29)	.495
Mild disability, n (%)	52 (89.7)	48 (90.6)	29 (96.7)	.637
Moderate disability, n (%)	5 (8.6)	5 (9.4)	1 (3.3)	
Severe disability, n (%)	1 (1.7)	-	-	
Patient global VAS score	35 (IQR 30)	35 (IQR 40)	30 (IQR 30)	.685
Physician global VAS score	20 (IQR 23)	25 (IQR 28)	20 (IQR 20)	.264

Note: Abbreviations: AS, ankylosing spondylitis; HAQ-DI, Health Assessment Questionnaire-Disability Index; IQR, interquartile range; n, number; PsA, psoriatic arthritis; RA, rheumatoid arthritis; ULS-8, UCLA Loneliness Scale-8; VAS, visual analog score.

[a]Denotes statistically significant pairs in the same row (post hoc adjusted $P < .05$).

$P < .001$), social support ($\rho = -0.22$, $P = .009$), and HAQ-DI ($\rho = 0.27$, $P = .001$) scores but not with the patient global VAS score ($\rho = 0.1$, $P = .224$). Beck depression and anxiety scores correlated with each other ($\rho = 0.6$, $P < .001$) and with the patient and physician global VAS, social support, and HAQ-DI. The HAQ-DI score also correlated with the social support ($\rho = -025$, $P = .003$), and patient ($\rho = 0.5$, $P < .001$) and physician ($\rho = 0.28$, $P < .001$) global VAS scores beside the Beck depression ($\rho = 0.53$, $P < .001$) and anxiety ($\rho = 0.53$, $P < .001$) scores. Among demographic and clinical parameters, only the number of drugs used had an association with the HAQ-DI score ($\rho = 0.18$, $P = .037$).

3.5 | Loneliness and disease activity measures

ULS-8 score did not correlate with the DAS28-ESR ($\rho = 0.03$, $P = .837$), DAS28-CRP ($\rho = 0.1$, $P = .464$) CDAI ($\rho = 0.12$, $P = 385$), and SDAI ($\rho = 0.18$, $P = 180$) in RA; BASDAI ($\rho = 0.02$, $P = .872$), BASFI ($\rho = 0.14$, $P = .319$), and ASDAS-ESR ($\rho = -0.14$, $P = .317$) ASDAS-CRP ($\rho = -0.07$, $P = .619$) in AS; and the number of swollen ($\rho = 0.06$, $P = .744$) and tender joints ($\rho = 0.05$, $P = .776$), ESR ($\rho = 0.02$, $P = .909$), serum CRP ($\rho = -0.30$, $P = .104$), patient global ($\rho = -0.07$, $P = .700$), physician global ($\rho = 0.04$, $P = .821$), pain ($\rho = -0.03$, $P = .867$), and fatigue ($\rho = -0.06$, $P = .758$) VAS scores in PsA groups. The presence of enthesitis and uveitis in AS, active psoriasis in PsA, and hand deformities in RA and PsA groups had also no association with the ULS-8 score.

3.6 | Predictors of functional status and loneliness

Two multiple regression models were generated for predicting the outcome variables (ie the HAQ-DI and ULS-8 scores) by including the singly associated variables. Depression ($\beta = 0.188$), anxiety ($\beta = 0.332$) and patient global VAS ($\beta = 0.433$) scores remained significant for predicting HAQ-DI after multiple regression with the covariates ULS-8, depression, anxiety, social support, patient and physician global VAS scores, and number of drugs used (adjusted

TABLE 3 Correlation matrix of the ULS-8, HAQ-DI, Beck depression, Beck anxiety, social support, and patient and physician global VAS scores

	Beck depression score	Beck anxiety score	Social support score	Patient global VAS score	Physician global VAS score	HAQ-DI score
ULS-8 score						
ρ	0.32	0.33	−0.22	0.1	0.16	0.27
P value	<.001	<.001	.009	.224	.058	.001
HAQ-DI score						
ρ	0.53	0.53	−0.25	0.5	0.28	
P value	<.001	<.001	.003	<.001	<.001	
Physician global VAS score						
ρ	0.29	0.23	-0.08	0.69		
P value	0.001	0.005	0.33	<0.001		
Patient global VAS score						
ρ	0.36	0.35	−0.2			
P value	<.001	<.001	.016			
Social support score						
ρ	-0.3	−0.22				
P value	<.001	.008				
Beck anxiety score						
ρ	0.6					
P value	<.001					

Abbreviations: HAQ-DI, Health Assessment Questionnaire-Disability Index; ULS-8, UCLA Loneliness Scale-8; VAS, visual analog scale.

$R^2 = 0.53$, $P < .001$). In multiple regression with the covariates HAQ-DI, depression, anxiety, social support, physician global VAS scores, number of drugs used, and education status, only the education status ($\beta = -0.208$) significantly predicted the ULS-8 score (adjusted $R^2 = 0.15$, $P < .001$).

4 | DISCUSSION

We performed a comprehensive psychometric, clinical, and functional assessment to test the hypothesis of a significant relationship of loneliness with psychosocial and disease characteristics in Turkish patients with RA, AS, and PsA. One in six to seven patients with inflammatory arthritis had moderate to severe depression and anxiety. Those with depression and anxiety had higher loneliness scores. Besides depression and anxiety, we have found that loneliness was associated with social support, disability, the number of drugs used, and the education status. Education status was the only independent predictor of loneliness. Documentation of loneliness and related factors is an initial step to increase the awareness of such an overlooked aspect of the psychosocial status in inflammatory arthritis patients and may lead to consider research in other rheumatic diseases as well. It may also help to shape the psychosocial interventions, particularly in patients with functional disability.

In a cross-sectional study of over 1000 patients regarding psychological impact of inflammatory arthritis and support needs from regional rheumatology units across England, isolation, loneliness, poor communication (feeling unheard by family, friends, and physicians), and lack of psychological support (particularly from the physician) were identified as the categories of psychological distress.[16] This study showed that, in addition to valuing the support of peers and family, inflammatory arthritis patients looked to the rheumatology team for validation and support. Moreover, patients identified physicians' guide to appropriate support as helpful although often not provided.[16]

In another study from the Netherlands conducted in 927 patients with various rheumatic diseases including RA, AS, osteoarthritis, other systemic rheumatic diseases, and fibromyalgia, lack of social support and invalidation were identified as independent predictors of loneliness after control for age, gender, education, working, and relationship status.[17] Notably, loneliness scores, assessed by a 1-item Likert-type scale, were similar in different rheumatic disease groups except in patients with fibromyalgia who felt more lonely. We did not identify the lack of social support as a significant predictor of loneliness in multivariable analysis in our patient group with inflammatory arthritis although the social support and ULS-8 scores correlated. Different scales to measure loneliness (see below) and social support (revised multidimensional scale of perceived social support used in the present study was structured mainly on the source of support, whereas the social support survey used in the study by Kool and Geenen[17] was structured on the type of support), heterogenous patient groups, and sociocultural issues may be speculated to account for the discrepancy in the results. Perception of loneliness and its differential expression in terms of lack of social support may be explained by culturally unique expectations concerning relationships. This may

be supported by the observation that people from more individualist cultures value social networks more in coping with loneliness compared to people from more communal cultures which already provide such networks.[19,20] Interestingly, lower education was associated with loneliness in both populations, but age, working, and marital status were not so in our study group in contrast to Dutch patients.[17] This could be explained by social interconnectedness compensating for age, working, and marital status-related contribution to loneliness. In predominantly communal cultures, loneliness of an individual is usually considered a culturally determined social duty to be solved rather than a personal emotional experience to be suffered. These imply the necessity of culture-specific healthcare strategies in coping with loneliness and underline the importance of a multidisciplinary approach to patients with rheumatic diseases.

In a cross-cultural study comparing women with RA from the Netherlands and Egypt in terms of loneliness (assessed by a 1-item Likert-type scale), the leading predictor of loneliness in both populations was the worse affect (anxiety and depression).[18] Similar to the findings of the study conducted in the same population by Kool and Geenen,[17] lack of social support was important in explaining loneliness in the Netherlands but not in Egypt.[18] There were significant associations between the depression, anxiety, and loneliness scores in our study (Table 3), but these were confounded by the education status in multiple regression analysis.

Because of the methodological differences and to be able to make more direct comparisons with the prior research, we reperformed the analyses by using the 0-10 point VAS for loneliness instead of ULS-8. Loneliness VAS score was significantly associated with depression ($\rho = 0.335$), anxiety ($\rho = 0.239$), social support ($\rho = -0.431$), functional status ($\rho = 0.193$), patient global health assessment ($\rho = 0.148$), and the number of drugs used ($\rho = 0.189$), but not with the education status. Note that the correlation coefficients of the loneliness VAS score and ULS-8 score with the anxiety, patient global VAS, and the social support scores are quite different (Table 3). Thus, the 1-item VAS for loneliness and ULS-8 give different results and this may be related to education status, which was the single independent predictor of the ULS-8 but not even associated with the loneliness VAS score in our study group. Additionally, since loneliness VAS is a global self-reflection, it may be more sensitive to the current mood state and may lack reliability compared to the more comprehensive ULS-8. Interestingly, if we run a multiple regression to predict the loneliness VAS score with the above-mentioned associated variables, the worse affect does not significantly predict loneliness, and the social support score and number of drugs used would become the independent predictors of loneliness (β[social support score] = −0.333, β[number of drugs used] = 0.175, adjusted $R^2 = 0.131$, $P < .001$). Since loneliness is a perceived feeling, the Dutch and Egyptian patients with rheumatic diseases may feel lonely primarily affected by the worse affect while Turkish patients with inflammatory arthritis may feel so primarily affected by the lack of social support *when assessed by a 1-item tool*. The measurement tool for loneliness seems to be of substantial importance according to our findings as discussed previously in the literature.[21]

Notably, the results of a randomized (55 and 53 patients to intervention and waiting list groups, respectively), internet-based, multimodal, cognitive-behavioral intervention study for RA (RAHelp) demonstrated that self-efficacy may be improved while loneliness may be reduced after educational intervention covering the topics Overview and Rationale, RA Stressors, Effective Coping, Life Goals, Pain Management, Emotional Responses, Managing Change, Self-Esteem, Relationships, and Community Participation, although affective symptoms and arthritis scores did not significantly improve.[33] Quality of life was still better in the intervention group in the 9th month post-intervention.

Lastly, although no association between loneliness and the type of rheumatic disease (except fibromyalgia) was reported in previous studies,[16-18,34] to our knowledge, the relationship between loneliness and disease activity measures in separate disease groups was not previously reported.

Limitations of this study include a relatively small sample size with a potentially high type II error rate, particularly for the subgroup analyses and the cross-sectional design that prevents the proper interpretation of causality. The patients were from a single center and no healthy control group was present. Medical and psychiatric history of the participants were self-reported and not based on detailed examination. Patients with moderate to severe depression, anxiety, and disability were low in number. Direct comparisons and more conclusive interpretations were not possible because of the methodological differences with the previously published studies. Strengths of the study include a comprehensive evaluation of the disease activity measures in relation to loneliness and other psychosocial determinants in a particular patient group of RA, AS, and PsA which, to the best of our knowledge, has not been reported before.

In conclusion, loneliness is associated with depression, anxiety, lack of social support, disability, higher number of drugs used, and lower education but not with disease activity in Turkish patients with RA, AS, and PsA. Perception and expression of loneliness vary according to the cultural background. The assessment tool for loneliness is of substantial importance and single-item scales may lack reliability.

CONFLICT OF INTEREST

The authors declare they have no conflict of interest.

AUTHOR CONTRIBUTIONS

Concept and design: HE OK. Data collection and processing: HE, Uİ, ST. Analysis and interpretation: HE, Uİ, OK. Literature review: HE, Uİ, ST, OK. Writing: HE, Uİ, ST. Critical review: HE, Uİ, ST, OK

INFORMED CONSENT AND ETHICAL APPROVAL

Written informed consent was obtained from each patient to use clinical data for research purposes. Institutional Review Board of Trakya University Medical School approved the study (Date/Number: TÜTF-BAEK 2018/170-08/04).

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SUPPORTING INFORMATION

Additional Supporting Information may be found online in the Supporting Information section.

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