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Short communication

Prevalence and determinants of state and trait anxiety in inflammatory rheumatic diseases

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ABSTRACT

Background: Anxiety is a frequent but often under-recognized comorbidity in patients with inflammatory rheumatic diseases. This study aimed to assess the prevalence of state and trait anxiety in patients with rheumatoid arthritis (RA), psoriatic arthritis (PsA), and axial spondyloarthritis (axSpA), and to identify their sociodemographic, clinical, and psychological correlates and independent determinants.

Methods: In this cross-sectional study, 807 consecutive outpatients were recruited. Anxiety was assessed using the State–Trait Anxiety Inventory (STAI-X1 and STAI-X2). Sociodemographic data, disease activity indices, functional disability, pain, pharmacological treatments, and radiographic progression were recorded. Depressive symptoms, perceived stress, fatigue, and coping strategies were evaluated using validated questionnaires. Univariate and multivariable logistic regression models were performed to identify independent determinants of anxiety.

Results: Moderate to high levels of state anxiety were observed in 19.8% of patients, while 22.3% exhibited moderate to high trait anxiety. Patients with higher anxiety levels showed greater disease activity, functional disability, pain intensity, radiographic progression, depressive symptoms, perceived stress, fatigue, and more frequent use of dysfunctional coping strategies (all $p < 0.001$). In multivariable analyses, state anxiety was independently associated with functional disability (OR = 2.11) and radiographic progression (OR = 1.72). Trait anxiety was independently associated with functional disability (OR = 1.58), female sex (OR = 2.13), glucocorticoid use (OR = 1.59), depression (OR = 1.46).

Conclusion: Anxiety is highly prevalent and is closely linked to functional disability, disease severity, and maladaptive psychological factors. Distinct determinants characterize state and trait anxiety, supporting the need for routine psychological assessment and integrated, patient-centered care in rheumatology.

1. Introduction

Inflammatory rheumatic diseases, including rheumatoid arthritis (RA), psoriatic arthritis (PsA), and axial spondyloarthritis (axSpA), are chronic conditions characterized by pain, functional impairment, and progressive structural damage. In addition, they are increasingly recognized to have a substantial psychological impact [1], with anxiety being the most prevalent and clinically relevant psychological comorbidity. Despite its relevance, it remains insufficiently addressed in routine practice. Anxiety is a multidimensional construct. State anxiety reflects situational emotional responses to perceived threats, whereas trait anxiety represents a relatively stable predisposition to experience anxiety across situations [2].

Psychological variables, such as perceived stress, fatigue, depressive symptoms, and coping strategies, may further modulate anxiety levels in these patients.

By distinguishing state and trait anxiety, the present study aims to: (1) assess their prevalence; (2) examine their associations with sociodemographic, clinical, and psychological characteristics; and (3) identify independent determinants.

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2. Methods and materials

2.1. Clinical sample

Patients were consecutively recruited from 30 March 2016 to 28 February 2017 during routine outpatient visits at the Rheumatology Unit of the Integrated University Hospital of Verona, Verona (Italy). Eligible criteria were: age ≥ 18 and a diagnosis of RA according to the 2010 ACR/EULAR criteria, AxSpA according to ASAS criteria, or PsA according to CASPAR criteria. Individuals with fibromyalgia, connective tissue diseases (Systemic Lupus Erythematosus, Sjogren, sclerodermas, dermatomyositis, polymyositis), vasculitis, gout, infective arthritis, rheumatic polymyalgia, or other severe systemic diseases, as well as a lack of knowledge of the Italian language and other limitations in verbal communication, were excluded [3]. The study received ethical approval from the Ethics Committee (CESC15840).

2.2. Measurements

Disease activity was assessed using the Disease Activity Score in 28 joints with C-reactive protein (DAS28-CRP) for RA [4], the Disease Activity Index for Psoriatic Arthritis (DAPSA) [5], and the Ankylosing Spondylitis Disease Activity Score with CRP (ASDAS-CRP) [6].

Functional disability was evaluated using the Health Assessment Questionnaire Disability Index (HAQ-DI) [7]. Pain was assessed by a Visual Analogue Scale (VAS).

Rheumatologic treatments were classified as first-line therapies [conventional synthetic disease-modifying antirheumatic drugs (csDMARDs) and/or anti–tumor necrosis factor agents] or second-line therapies [biologic DMARDs and targeted synthetic DMARDs, with or without csDMARDs] [3].

Anxiety was assessed using the State–Trait Anxiety Inventory (STAI), specifically STAI-X1 (state anxiety) and STAI-X2 (trait anxiety) [8]. The Quick Inventory of Depressive Symptomatology (QIDS) [9] was used for depressive symptoms, the Perceived Stress Scale (PSS) for stress [10], and the Chalder Fatigue Questionnaire (CFQ) [11] for fatigue. Coping strategies were assessed using the Coping Orientation to Problems Experienced questionnaire (COPE-NIV, Italian version) [12].

2.3. Statistical analysis

Since total STAI scores greater than 50 have been used to indicate pathological levels of anxiety [13], we used this cut-off to classify patients into two groups: absent/mild anxiety (≤50) and at least moderate anxiety (>50). Comparisons were performed by *t*-tests and chi-square tests, as appropriate. Univariable logistic regression models were estimated to explore associations between each sociodemographic, clinical, and psychological variable and anxiety status. Variables statistically significant ($p < 0.05$) and with an odds ratio indicating a small-to-medium clinical effect (OR ≥ 1.5) [14] were included in multivariable logistic regression models. Analyses were performed using Stata 17.

3. Results

3.1. Sociodemographic characteristics

The sample included 807 patients: 19.8% of them exhibited at least moderate state anxiety, while 22.3% trait anxiety. The mean age was 57.3 (± 12.5). Patients with moderate/high trait anxiety were significantly older than those with absent/mild trait anxiety (59.6 years ±12.5; 56.7 years ±12.5; $p = 0.005$). Women were 70.6% of the sample. Significant sex differences were observed for both state anxiety (68.3% vs. 80.0%; $p = 0.004$) and trait anxiety (65.9% vs. 80.0%; $p < 0.001$). More than half of the sample (55.4%) had a low educational level, which was associated with at least moderate state (65.6% vs 52.9%; $p = 0.004$) and trait anxiety (64.4% vs 52.8%; $p = 0.006$). Unemployment was significantly more frequent among patients with moderate/high trait anxiety (48.6% vs. 65.0%; $p < 0.001$).

3.2. Rheumatologic clinical and psychological characteristics

As shown in Table 1, 60.7% patients were affected by RA, 24.5% by PsA, 14.7% by axSpA, with a higher prevalence of RA and axSpA observed for trait anxiety. Disease activity scores were significantly higher in patients with moderate/high anxiety for both state and trait anxiety across all diagnoses. Obesity and radiographic progressions were more prevalent among those with moderate/high trait anxiety, while functional disability and pain intensity scores were significantly higher in patients with moderate/high anxiety for both state and trait anxiety. Second-line therapy and glucocorticoid use, as well as antidepressants, were more frequent among patients with higher trait anxiety.

Depressive symptoms, perceived stress, and fatigue were significantly higher in patients with at least moderate anxiety for both state and trait anxiety. Problem-focused coping was significantly lower in patients with moderate/high anxiety for both state and trait anxiety, whereas dysfunctional coping was significantly higher in patients with moderate/high anxiety.

3.3. Determinants of state and trait anxiety

Univariate logistic regression models identified the characteristics associated with higher odds of state and trait anxiety (Supplementary Tables S1-S2). In the multivariable models, including only significant variables with OR ≥ 1.5, two characteristics remained independently associated with state anxiety: functional disability (OR = 2.11; $p < 0.001$) and radiographic progression (OR = 1.72; $p = 0.004$), while four factors with trait anxiety: functional disability (OR = 1.58; $p = 0.012$), female sex (OR = 2.13; $p = 0.010$), glucocorticoid use (OR = 1.59; $p = 0.044$) and depression (OR = 1.46; $p < 0.001$) (see Table 2).

4. Discussion

Our findings confirm that anxiety represents a frequent and clinically relevant comorbidity in RA, PsA, and axSpA, with prevalence rates consistent with those reported in previous studies [15].

Patients with state or trait anxiety were predominantly female, in line with the literature [16] that recognizes psychosocial, economic, and biological factors [17], including rheumatologic diseases [18]. Patients with trait anxiety were older, which may reflect age-related reductions in self-efficacy and social support. Lower educational attainment was associated with both state and trait anxiety. Higher education has been proposed as a protective factor against anxiety [19], possibly through improved health literacy, greater coping resources, and greater access to care. Patients with higher anxiety levels were less frequently employed, consistent with findings in RA and in axSpA, where work disability related to pain and functional impairment significantly affects psychological well-being [20]. Chronic anxiety can contribute to difficulties in maintaining employment.

Obesity was more prevalent among patients with elevated trait anxiety, partly due to stigmatization and the negative impact on health and quality of life, leading to chronic stress.

Patients with anxiety showed higher disease activity scores, consistent with studies in RA [21], axSpA [22], and, less consistently, PsA [23]. Functional disability strongly affects the psychosocial well-being in chronic diseases [24]. Anxiety, in turn, is associated with worsening functional impairment.

Patients with higher trait and state anxiety exhibited greater disability, and functional disability emerged as one of the strongest predictors of anxiety in RA [25], PsA [26], and axSpA [27].

Pain was higher among anxious patients, as previously reported [28]. Anxiety and pain appear to have a bidirectional relationship [29].

Glucocorticoid use was significantly associated with severe anxiety,

Table 1
Clinical and psychological characteristics of rheumatic disease in the study sample ($N = 807$) and comparison between anxiety severity groups based on state (STAI-X1) and trait anxiety (STAI-X2), respectively.

Clinical and psychological characteristics	Total sample	STAI-X1 State			STAI-X2 Trait		
		STAI-X1 ≤ 50	STAI-X1 > 50	*p* value	STAI-X2 ≤ 50	STAI-X2 > 50	*p* value
Diagnosis							
Rheumatoid arthritis, n (%)	490 (60.7%)	392 (60.6%)	98 (61.3%)	0.923	369 (58.9%)	121 (67.2%)	0.030
Spondyloarthritis, n (%)	119 (14.7%)	97 (15.0%)	22 (13.8%)		103 (16.4%)	16 (8.9%)	
Psoriatic arthritis, n (%)	198 (24.5%)	158 (24.4%)	40 (25.0%)		155 (24.7%)	43 (23.9%)	
Disease activity							
DAS28-CRP, mean (SD)	2.90 (1.06)	2.8 (1.06)	3.2 (0.99)	0.001	2.8 (1.1)	3.2 (0.9)	<0.001
ASDAS, mean (SD)	2.50 (1.10)	2.3 (1.05)	3.4 (0.89)	<0.001	2.4 (1.1)	3.1 (1.02)	0.019
DAPSA, mean (SD)	15.20 8.78)	14.3 (8.6)	18.6 (8.7)	0.005	13.8 (7.4)	20.4 (11.3)	<0.001
Disease duration, years, mean (SD)	11.2 (8.9)	11.2 (8.9)	11.6 (8.9)	0.565	11.2 (8.9)	11.6 (9.2)	0.569
Obesity (BMI ≥30), n (%)							
No	661(81.9%)	536 (82.8%)	125 (78.1%)	0.170	524 (83.6%)	137 (76.1%)	0.028
Yes	146 (18.1%)	111 (17.2%)	35 (21.9%)		103 (16.4%)	43 (23.9%)	
Comorbidity, n (%)							
No	84 (10.4%)	67 (10.4%)	17 (10.6%)	0.886	72 (11.5%)	12 (6.7%)	0.071
Yes	723 (89.6%)	580 (89.6%)	143 (89.4%)		555 (88.5%)	168 (93.3%)	
Family history, n (%)							
No	582 (72.1%)	471 (72.8%)	111 (69.4%)	0.431	452 (72.1%)	130 (72.2%)	1.000
Yes	225 (27.9%)	176 (27.2%)	49 (30.6%)		175 (27.9%)	50 (27.8%)	
Erosions, n (%)							
No	552 (68.4%)	452 (69.9%)	100 (62.5%)	0.087	435 (69.4%)	117 (65.0%)	0.276
Yes	255 (31.6%)	195 (30.1%)	60 (37.5%)		192 (30.6%)	63 (35.0%)	
Radiographic progression, n (%)							
No	455 (56.4%)	387 (59.8%)	68 (42.5%)	<0.001	373 (59.4%)	82 (45.6%)	0.001
Yes	352 (43.6%)	260 (40.2%)	92 (57.5%)		254 (40.5%)	98 (54.4%)	
Rheumatologic therapy, n (%)							
First-line [1]	626 (77.6%)	506 (78.2%)	120 (75.0%)	0.398	498 (79.4%)	128 (71.1%)	0.020
Second-line [2]	181 (22.4%)	141 (21.8%)	40 (25.0%)		129 (20.6%)	52 (28.9%)	
Glucocorticoid use, n (%)							
No	496 (61.5%)	414 (64%)	82 (51.2%)	0.004	417 (66.5%)	79 (43.9%)	<0.001
Yes	311 (38.5%)	233 (36.0%)	78 (48.8%)		210 (33.5%)	101 (56.1%)	
NSAID therapy[3], n (%)							
No	592 (73.4%)	486 (75.1%)	106 (66.3%)	0.028	462 (73.7%)	130 (72.2%)	0.703
Yes	215 (26.6%)	161 (24.9%)	54 (33.8%)		165 (26.3%)	50 (27.8%)	
Disability (HAQ-DI), mean (SD)	0.69 (0.65)	0.61 (0.62)	1.02 (0.67)	<0.001	0.56 (0.7)	1.14 (0.72)	<0.001
Pain (VAS), mean (SD)	5.10 (2.70)	4.74 (2.60)	6.51 (2.23)	<0.001	4.71 (2.60)	6.40 (2.30)	<0.001
Depression (QIDS), mean (SD)	6.9 (4.4)	5.8 (3.5)	11.5 (4.6)	<0.001	5.6 (3.2)	11.7 (4.6)	<0.001
Perceived stress (PSS), mean (SD)	20.0 (5.5)	19.2 (5.2)	23.4 (5.2)	<0.001	19.2 (5.2)	22.9 (5.3)	<0.001
Fatigue (CFQ), mean (SD)	4.35 (4.2)	3.7 (3.9)	7.2 (4.2)	<0.001	3.7 (3.95)	6.8 (4.1)	<0.001
Coping styles (COPE), mean (SD)							
Problem-focused	47.6 (10.7)	48 (10.8)	46.1 (10.2)	0.045	48.1 (10.9)	45.8 (9.8)	0.011
Emotion-focused	45.4 (8.9)	45.5 (8.9)	44.9 (8.8)	0.405	45.4 (9.0)	45.5 (8.6)	0.864
Dysfunctional coping	22.5 (5.2)	21.8 (4.9)	25.4 (5.1)	<0.001	21.6 (4.8)	25.9 (4.9)	<0.001
Antidepressant therapy, n (%)							
No	756 (93.7%)	614 (94.9%)	142 (88.8%)	0.010	600 (95.7%)	156 (86.7%)	<0.001
Yes	51 (6.3%)	33 (5.1%)	18 (11.3%)		27 (4.3%)	24 (13.3%)	

STAI-X1: State–Trait Anxiety Inventory X1 (state anxiety); STAI-X2: State–Trait Anxiety Inventory X2 (trait anxiety);
RA: Rheumatoid Arthritis; axSpA: Spondyloarthritis; PsA: Psoriatic Arthritis; DAS28-CRP: Disease Activity Score 28–CRP; DAPSA: Disease Activity in Psoriatic Arthritis; ASDAS: Ankylosing Spondylitis Disease Activity Score; CRP: C-reactive protein; BMI: Body Mass Index; NSAIDs: non-steroidal anti-inflammatory drugs; HAQ-DI: Health Assessment Questionnaire Disability Index; VAS: Visual Analogue Scale. QIDS: Quick Inventory of Depressive Symptomatology; PSS: Perceived Stress Scale; CFQ: Chalder Fatigue Questionnaire; COPE: Coping orientation to the problem experienced.
[1] csDMARDs and/or anti-TNF;
[2] anti-IL6 / bDMARDs / tsDMARDs with or without csDMARDs;
[3] NSAIDs used in the previous 10 days.

particularly trait anxiety, as previously reported [30]. These treatments warrant careful monitoring of psychological status.

Patients with higher anxiety levels reported more severe depressive symptoms, greater perceived stress, higher fatigue, and increased use of dysfunctional coping strategies. Depression emerged as the psychological factor most strongly associated with anxiety, particularly trait anxiety. This finding is consistent with the close relationship between depression and anxiety and their shared component of negative affect, as described in the tripartite model [31]. In contrast, problem-focused coping was less frequently adopted by anxious patients, suggesting reduced perceived control over the disease. These findings are consistent with previous studies emphasizing the role of maladaptive coping in psychological distress in rheumatic diseases [10].

Functional disability emerged as the factor most strongly associated with both state and trait anxiety in multivariable analyses. This finding suggests a close relationship between impaired daily functioning and psychological well-being. Disability may represent an indicator of disease burden, integrating pain, fatigue, joint damage, and limitations in social and occupational participation. Radiographic progression was independently associated only with state anxiety, a finding consistent with the situational nature of anxiety. Structural damage may be linked to greater awareness of disease irreversibility and future disability, which could contribute to acute anxiety responses. In contrast, trait anxiety was independently associated with female sex, glucocorticoid use, and depression in addition to disability. The higher prevalence of trait anxiety among women is consistent with epidemiological evidence in both the general population and rheumatologic cohorts [15]. The association with glucocorticoid use may reflect both their

Table 2
Multivariate logistic regression model for factors associated with at least moderate state anxiety (STAI-X1 > 50) and trait anxiety (STAI-X2 > 50) (N = 807). Only variables with OR ≥ 1.50 (p < 0.05) in univariate models were included in the multivariate model.

Independent variable	Outcome: at least moderate state anxiety (STAI- X1 > 50)		
	OR	95% CI	*p* value
Disability (HAQ-DI)	2.11	1.59–2.81	<0.001
Radiographic progression	1.72	1.19–2.48	0.004
Female sex	1.28	0.81–2.01	0.284
Low education	1.44	0.98–2.10	0.060
Glucocorticoid therapy	1.11	0.76–1.64	0.583
NSAIDs use (last 10 days)	1.34	0.90–1.99	0.155

Independent variable	Outcome: at least moderate trait anxiety (STAI-X2 > 50)		
	OR	95% CI	*p* value
Disability (HAQ-DI)	1.58	1.11–2.26	0.012
Female sex	2.13	1.20–3.78	0.010
Glucocorticoid therapy	1.59	1.01–2.50	0.044
Unemployed	1.28	0.79–2.08	0.317
Radiographic progression	1.07	0.69–1.65	0.775
Low education	1.15	0.72–1.84	0.555
Obesity (BMI ≥ 30)	0.95	0.55–1.64	0.846
Second-line therapy	1.05	0.63–1.73	0.853
Depression (QIDS)	1.46	1.36–1.56	<0.001

STAI-X1: State–Trait Anxiety Inventory X1 (state anxiety); STAI-X2: State–Trait Anxiety Inventory X2 (trait anxiety); OR: odds ratio; CI: confidence interval; HAQ-DI: Health Assessment Questionnaire Disability Index; NSAIDs: non-steroidal anti-inflammatory drugs; BMI: body mass index; QIDS: Quick Inventory of Depressive Symptomatology.

neuropsychiatric effects and their use as a marker of more severe disease [30]. According to the tripartite model, the association between depression and trait anxiety is primarily driven by their shared dimension of negative affect [31].

The strength of this study lies in the large, clinically representative sample of patients recruited from a rheumatology outpatient service, thereby enhancing the generalizability of the findings. Moreover, the distinction between state and trait anxiety permits capturing both transient emotional responses and more stable individual vulnerability to anxiety. The most important limitation is the cross-sectional design, which precludes any inference regarding temporal or causal relationships between the variables investigated. Although the STAI-X threshold adopted in the present study was based on previous works [13], no universally accepted cut-off for clinically relevant anxiety has been established. The individual components of disease activity indices were not analyzed separately, limiting the ability to distinguish subjective from objective contributors to anxiety. Finally, although all consecutive patients attending our center over a one-year period were enrolled, minimizing the risk of selection bias, the generalizability of our findings to other clinical settings remains to be established.

5. Conclusions

Rheumatologic disease may act both as an acute stressor, inducing transient anxiety, and as a trigger that amplifies pre-existing vulnerability. Identifying patients at higher risk, particularly women and those with significant functional disability, is essential to improve patient-centered outcomes.

CRediT authorship contribution statement

Sarah Tosato: Writing – original draft, Validation, Supervision, Methodology, Conceptualization. **Chiara Bonetto:** Writing – review & editing, Validation, Methodology, Formal analysis, Conceptualization. **Lucia Maggioni:** Writing – review & editing. **Elena Fracassi:** Investigation. **Ginevra Zordan:** Investigation. **Nicole D'Archivio:** Investigation. **Filippo Montanari:** Investigation. **Maurizio Rossini:** Resources, Investigation. **Antonio Carletto:** Supervision, Project administration. **Branko Ristic:** Writing – review & editing, Methodology, Conceptualization.

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Declaration of competing interest

The authors have no interest to disclose.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jpsychores.2026.112934.

Data availability

The data are available from the authors upon reasonable request.

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