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ORIGINAL ARTICLE

The relationship between depressive symptoms, illness perceptions and quality of life in ankylosing spondylitis in comparison to rheumatoid arthritis

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Abstract Anxiety and depressive symptoms as well as cognitive variables are important in determining outcome in rheumatic diseases. We aimed to compare psychological distress symptoms and illness perceptions in ankylosing spondylitis (AS) and rheumatoid arthritis (RA) and to test whether their associations with health-related quality of life (HRQoL) were similar in these rheumatologic disorders. In 55 AS and 199 RA patients, we administered the Patient Health Questionnaire (PHQ-9), the Symptom Check-List and the Brief-Illness Perception Questionnaire to assess psychological variables and the World Health Organization Quality of Life Instrument, Short Form to assess HRQoL. We used hierarchical regression analyses to determine the associations between psychological variables and HRQoL after adjusting for demographic variables and disease parameters. The prevalence of clinically significant depressive symptoms (PHQ-9≥10) was 14.8 % in AS and 25.1 % in RA patients, but adjustment for demographics rendered these differences in depressive symptoms' severity non-significant. Psychological distress levels and HRQoL were similar in both disorders. Illness concern (b=−0.37) was the only significant independent correlate of physical HRQoL in AS. In RA, depression (b=−0.25), illness concern (b=−0.14) and worries about the consequences of the disease (b=−0.31) were the independent correlates of physical HRQoL. These findings suggest that cognitive variables are important correlates of HRQoL in AS, whereas in RA depressive symptoms and illness perceptions equally contribute to HRQoL. Our data encourage the design of psychotherapeutic trials targeting disease-related cognitions in AS in an attempt to improve patient's physical HRQoL.

Keywords Ankylosing spondylitis · Anxiety · Depression · Illness representations · Quality of life

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Introduction

Ankylosing spondylitis (AS) is a chronic inflammatory disease of the sacroiliac joints and spine that begins usually in young adulthood and is more common in men. Prevalence among white populations varies from 0.5 to 1.0 % [1]. In our catchment area, the prevalence is 29.5/100,000 adults [2]. Apart from the axial and articular manifestations, AS may present with extra-articular manifestations such as enthesitis and acute anterior uveitis; involvement of other systems may also occur, such as pulmonary and cardiovascular involvement, neurologic lesions, inflammatory bowel disease and psoriasis. AS causes severe pain and disability; a significant number of patients have spinal osteoporosis, resulting in vertebral fractures and thoracic kyphosis [1], while a remarkable proportion require assistance at work or even withdraw from the workforce [3]. The high health care utilization [4] and the impaired health-related quality of life

(HRQoL) compared to healthy controls [5, 6] highlight the disease's burden. Therefore, the identification of treatable psychosocial factors associated with HRQoL is a research priority, which could ultimately lead to the development of beneficial psychological interventions.

Evidence suggests that patients with rheumatologic disorders have high levels of psychological distress, especially depressive symptoms, which significantly impair their HRQoL [4, 7]. The prevalence of current major depressive disorder (MDD) in rheumatologic disorders ranges between 17 and 22.5 % [8, 9], but the prevalence of lifetime MDD is even higher, up to 47 % [10]. Although depressive symptoms make unique contributions to health outcomes in rheumatologic patients, few studies have investigated the prevalence and severity of depressive and other symptoms of psychological distress in AS. A recent study [11], using the Zung Self-Rating Depression Scale (ZDS) [12], reported that 27.4 % of AS patients presented clinically significant depressive symptoms, while in other studies the prevalence of depression ranged from 20 to 31 % [13–15]. However, no study has investigated the prevalence and severity of depressive symptoms using validated instruments based on the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) diagnostic criteria [16], such as the Patient Health Questionnaire (PHQ-9) [17], which we have shown to be a valid MDD screening inventory in rheumatologic populations [18].

Cognitive variables are also important in determining outcome in rheumatologic patients [8, 9]. Patients develop representations of their illness to make sense of and adapt to the difficulties their illness causes. These representations are organized in various components and may influence patients' ability to cope [19]. Each patient creates his/her own ideas about the identity, cause, timeline or the consequences of the illness and beliefs about its cure and controllability. Several illness perceptions are associated with HRQoL in rheumatoid arthritis (RA) [8, 9], systemic sclerosis [20] or psoriatic arthritis [21]. To the best of our knowledge, however, no study has investigated illness perceptions in AS and their associations with HRQoL. Furthermore, we have shown that the effect of anxiety, depression and illness perceptions on physical HRQoL is rather complex and differs between psoriatic arthritis and RA [21]. We examine here whether the same applies to AS patients. This study aimed to test the following hypotheses:

1. That AS patients present remarkable levels of clinically significant psychological distress symptoms, at least similar to RA patients;
2. That both psychological distress (i.e. anxiety and depressive symptoms) and illness perceptions are independent correlates of impaired HRQoL in AS patients, after adjusting for age, gender, education and disease's parameters;
3. That the effect of anxiety, depression and illness perceptions on physical HRQoL differs between AS and RA, given the different clinical presentations and physical consequences of these diseases.

Methods

Participants and procedures

Data were collected during the baseline assessment of the cohort study "Psychological factors and HRQoL in rheumatologic diseases" in consecutive patients treated at the Rheumatology Department, University Hospital of Ioannina, Greece, which provides secondary and tertiary care for 350,000 inhabitants. The main objective of this ongoing prospective cohort is to evaluate treatment response and to determine the independent contribution of psychosocial variables in the formation of HRQoL in patients with rheumatologic disorders 3 years later. In the present cross-sectional study, we recruited a sample of AS attending a follow-up clinic during the 6-month period of 1 April 2010 to 1 October 2010. Diagnosis of AS was based on the modified New York criteria [22]. Exclusion criteria were inability to read and write Greek, history of psychotic illness, alcohol and/or drug abuse or dementia. Patients were examined and assessed for eligibility by experienced rheumatologists (NT and PVV). After complete explanation of the study to 65 eligible patients, 55 agreed to participate (response rate, 84.6 %). No statistically significant differences were found in age between participants and non-participants.

To test whether AS patients' psychological distress levels, illness perceptions and HRQoL differed from that of patients with another rheumatologic disease, 199 consecutive RA patients attending the same department during the same time period served as disease controls. RA was chosen because it shares similarities with AS and was used for comparison in previous studies evaluating HRQoL in AS [5, 23, 24]. RA diagnosis was confirmed using the American College of Rheumatology criteria [25].

The procedures complied with the ethical standards on human experimentation (World Medical Association, Helsinki Declaration). The study protocol was approved by the hospital's ethics committee. Signed informed consent was obtained from all participants.

Measures

Socio-demographic and clinical data were collected, and medical records were reviewed for coexisting medical conditions. The current use of anti-inflammatory, antirheumatic or antidepressant agents was also recorded. The severity of AS was defined using the Bath Ankylosing

Spondylitis Disease Activity Index (BASDAI), a composite score ranging from 0 to 10 based on the grading of fatigue, spinal pain, joint pain/swelling, areas of localized tenderness and morning stiffness; lower score represents less severe disease activity [26]. RA disease activity was estimated by disease activity for 28-joint indices score (DAS-28) [27]. The same rheumatologist (NT) assessed DAS-28 and BASDAI. Patients recorded the severity of pain on a visual analogue scale (VAS) from 0 to 100; higher scores indicate more severe pain. Psychological data were collected via a semi-structured interview by the same mental health professional (KK). All patients with PHQ-9 scores indicating clinically significant depressive symptoms (i.e. PHQ-9≥10) were referred to the outpatient department of psychiatry for further assessment and where clinically indicated, treatment. The following self-reported questionnaires were administered:

1. Patient Health Questionnaire (PHQ-9): Depressive symptoms' severity was assessed using the PHQ-9, a brief screen for depression whose specific items establish DSM-IV criteria-based diagnosis of MDD. It rates the frequency of symptoms over the past 2 weeks on a 0–3 Likert-type scale; summed scores range from 0 to 27 [17], yielding an index of depressive symptom severity ranging from no depression to severe depression (Table 1). We have shown that, at a threshold of 10 or more, PHQ-9 has a sensitivity of 81.2 % and specificity of 86.8 % in diagnosing MDD among Greek rheumatologic patients [18]. A definitive MDD diagnosis can only be established with a structured interview or a full clinical examination; therefore, we used here the cutoff of ≥10 to define patients with "clinically significant depressive symptoms".
2. Symptom Distress Checklist (SCL-90-R): To assess specific psychopathological profiles, the SCL-90-R was used. This 90-item multidimensional self-report symptom inventory measures a broad range of psychological distress symptoms in psychiatric and medical patients, namely: anxiety, depression, somatization, hostility, obsessive-compulsiveness, interpersonal sensitivity, phobic anxiety, paranoid ideation and psychoticism [28]. This instrument is also useful for the assessment of treatment response [29]. Higher scores indicate more severe symptoms. The SCL-90-R was chosen because it has been extensively validated in rheumatology samples [30] and is standardized for use in the Greek population [31].
3. Brief Illness Perception Questionnaire (B-IPQ): Illness perceptions were measured with the Greek version of the B-IPQ [32]. The B-IPQ uses a single-item approach to assess perceptions on a scale from 0 to 10. Five items assess cognitive illness representations: consequences (how much does your illness affect your life?); timeline (how long do you think your illness will continue?); personal control (how much control do you feel you have over your illness?); treatment control (how much do you think your treatment can help your illness?) and identity (how much do you experience symptoms from your illness?). Two items assess emotional representations: concern (how concerned are you about your illness?) and emotions (how much does your illness affect you emotionally?). One item assesses illness comprehensibility (how well do you feel you understand your illness?). The last question is an open-ended response item in which patients list the three most important causal factors for their illness. Responses can be grouped into categories, such as: stress, lifestyle, hereditary, etc. [32, 33].

Health-related quality of life

World Health Organization (WHO) defines quality of life (QoL) as the individual's perceptions of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns [34]. This definition is surrounded by conceptual limitations since it reflects the view that QoL refers to a subjective evaluation that is embedded in a cultural, social and environmental context. In an effort to overcome these limitations, WHO introduced the WHOQOL-100, a cross-culturally valid assessment which is available in several culture-specific and language-specific versions [35]. Its short form, the World Health Organization Quality of Life Instrument, Short-Form (WHOQOL-BREF) was developed for use when time is restricted and when respondent's burden must be minimised. The WHOQOL-BREF has similar psychometric properties to the WHOQOL-100 [34]. WHOQOL-BREF assesses four domains: physical, mental, social relations and environment HRQoL. It also includes facets assessing overall QoL and satisfaction with general health. Each item is rated on a five-point Likert scale, and scores are transformed to a 0–100 scale. Higher scores indicate better HRQoL. The WHOQOL-BREF was chosen because data from 23 countries, including Greece, showed that it is a valid instrument for the assessment of HRQoL across different cultures [34] and has adequate test–retest reliability, internal consistency and factor structure in rheumatologic populations [36]. Furthermore, the WHOQOL-BREF has been used to assess interventions aimed at improving HRQoL in patients with chronic medical conditions [37]. Finally, this instrument has been standardized for use within the Greek population [38].

A major concern in assessing HRQoL is that psychological distress is highly correlated with certain aspects of HRQoL. Thus, it has been suggested that psychological distress symptoms should always be considered thoroughly when assessing HRQoL to take the measurement overlap into account [39]. Since we showed that psychological distress mediates the relationship of psychosocial variables

Table 1 Demographic and clinical characteristics, causal representations and univariate comparisons between ankylosing spondylitis (AS) and rheumatoid arthritis (RA)

	AS (N=55) values	RA (N=199) values	d	p
Demographics				
Age (years) (mean±SD)	42.9±10.9	55.2±13.6	−0.941	<0.001[a]
Years of education (mean±SD)	11.0±3.5	8.0±4.2	0.739	<0.001 [a]
Female gender, N (%)	8 (14.5 %)	164 (82.4 %)	−1.493	<0.001 [b]
Divorced/widowed/separated, N (%)	1 (1.8 %)	19 (9.7 %)	−0.357	0.08 [b]
Clinical parameters				
Disease duration (years) (mean±SD)	15.3±11.5	13.7±10.5	0.149	0.479[a]
Pain (VAS-pain) (mean±SD)	0.88±0.77	0.94±0.88	−0.070	0.752[a]
RA DAS-28 (mean±SD)	–	2.72±0.96	–	–
AS BASDAI (mean±SD)	1.97±1.38	–	–	–
Comorbidity (N, %)				
Coronary artery disease	1 (1.8 %)	3 (1.5 %)	–	–
Thyroid disease	–	1 (0.5 %)	–	–
Diabetes	–	1 (0.5 %)	–	–
Myasthenia	–	1 (0.5 %)	–	–
Drug treatment (N, %)				
Disease-modifying anti-rheumatic drugs (methotrexate, leflunomide, hydoxyclorocine, cyclosporine A, sulfasalazine)	0 (0.0 %)	170 (85.4 %)	−0.779	0.001 [b]
Corticosteroids	0 (0.0 %)	16 (8.0 %)	−0.304	0.003 [b]
Biological agents				
(Etanercept, infliximab, adalimumab)	49 (89.1 %)	45 (22.6 %)	1.477	0.001 [b]
Antidepressants	0 (0.0 %)	14 (7.2 %)	−0.266	0.045 [b]
Patients' perceptions regarding the causal factors in their illness (N, %) (Causal representation item of B-IPQ)			0.496	0.03 [b]
Psychological	14 (25.4 %)	77 (59.7 %)		
Risk factors (e.g. diet, lack of exercise)	35 (63.6 %)	36 (27.9 %)		
Immunity	4 (7.3 %)	14 (10.9 %)		
Depression (PHQ-9)			−0.449	0.001 [b]
Score 0 (no depression)	13 (24.1 %)	10 (5.0 %)		
Score 1–4 (minimal depression)	19 (35.2 %)	81 (40.7 %)		
Score 5–9 (mild depression)	14 (25.9 %)	58 (29.1 %)		
Score 10–14 (moderate depression)	7 (13.0 %)	36 (18.1 %)		
Score 15–19 (moderate severe depression)	0 (0.0 %)	10 (5.0 %)		
Score 20–27 (severe depression)	1 (1.9 %)	4 (2.0 %)		
PHQ-9≥10	8 (14.8 %)	50 (25.1 %)	−0.279	0.09 [b]

d Cohen's *d* as the effect size; *BASDAI* AS severity index, *DAS-28* RA disease activity for 28-joint indices score, *B-IPQ* Brief Illness Perception Questionnaire, *HAQ-DI* Health Assessment Questionnaire–Disability Index, *PHQ-9* Patient Health Questionnaire 9

[a]Two tailed *t* tests

[b]Chi-square tests

with physical HRQoL in RA [40], we used physical HRQoL as an outcome measure. This domain also showed greater standardized response mean than other scales measuring disability in RA and may have increased statistical power in detecting change in rheumatologic patients [36].

Statistical analysis

The Statistical Package for the Social Sciences (SPSS) 15.0 (SPSS Inc., Chicago, IL, USA) for Windows was used. Summary statistics for all variables were calculated. Kolmogorov–Smirnov test for normality showed that parametric statistics were appropriate for the main independent variables and the outcome variable. Chi-square analyses for categorical data and two-tailed *t* tests for continuous data were carried out to assess the differences in major demographic and clinical variables between AS and RA. To assess differences in psychological distress, illness perceptions and HRQoL between AS and RA patients, one-way analyses of variance (ANOVA) were performed followed by one-way

analyses of covariance (ANCOVA) adjusted for age, sex, education and medications.

To test whether the associations between psychological distress and illness perceptions with physical HRQoL differed between AS and RA, we used hierarchical multiple regression analyses. First, we conducted univariate correlations between the psychological variables and physical HRQoL. Selection of independent variables for subsequent multivariate hierarchical regression analyses was based on the results of these analyses. As there were many significant illness perception components, preliminary separate stepwise multiple regression analyses were performed with dependent variable the physical HRQoL and independent variables the eight components of B-IPQ to determine the most important illness perceptions components associated with physical HRQOL in each disease.

A series of hierarchical models of regression analysis was next performed separately for AS and RA, with the dependent variable being the physical HRQoL. Demographic variables were entered in step 1, disease parameters in step 2 and the most significant illness perceptions in step 3. SCL-90-R anxiety and depression symptoms were entered in final step 4. The magnitude of the R^2 change at each step was used to determine the variance explained by each set of variables. Collinearity between independent variables was tested based on variance inflation factors (VIF) and tolerances for individual variables. Although significant, the emotional response component of B-IPQ was not included in hierarchical analyses as it showed high collinearity with the depression subscale of SCL-90-R. After this, all tolerance values were greater than 0.2 and all VIFs less than 2, indicating that multicollinearity was not biasing the regression models [41].

Results

Patient's characteristics

The median disease duration of AS patients was 12 years. The proportion of physical comorbidities was low in both diseases (2.3–2.5 %; Table 1), and disease activity was low. Most patients were on medications (AS=89.1 %; RA=85.4 %). The use of medications was only weakly associated with physical HRQoL in both AS (r=0.096, p=0.494) and RA (r=−0.093, p=0.202). More AS than RA patients had received biological agents, while the majority of RA patients had received disease-modifying anti-rheumatic drugs (DMARD) or a combination of DMRADs; no AS patient was on antidepressants compared to 17 (8.5 %) RA patients. AS patients were younger and had received more education; the proportion of males was higher within the AS sample. AS and RA patients had similar disease duration and pain levels (Table 1). Given these differences, all analyses performed to compare AS and RA were further adjusted for age, gender, education and medication.

Prevalence of clinically significant depressive symptoms and dimensions of psychological distress

As shown in Table 1, eight (14.8 %) AS patients presented PHQ-9 scores indicative of clinically significant depressive symptoms (PHQ-9≥10), compared to 50 (25.1 %) RA patients, but this difference failed to reach statistical significance (p=0.09). In general, however, AS patients presented less severe depressive symptoms than RA patients, as indicated by the SCL-90-R depression subscale (p=0.012) and the PHQ-9 total score (p=0.022; Table 2). However, adjustment for age, gender and education rendered these differences non-significant (Table 2). Furthermore, there was no significant difference between AS and RA patients in the other SCL-90-R psychological distress symptom dimensions (Table 2).

Illness perceptions and HRQoL

The AS patients attributed fewer somatic symptoms to their disease (identity), and they believed their disease had fewer consequences compared to RA patients, but adjustment for age, gender, education and medication also rendered these differences non-significant (Table 2). A significant proportion of AS patients (64.0 %) attributed their illness to various risk factors (e.g. diet, lack of exercise). On the other hand, RA patients considered their disease mainly a result of psychological factors (59.7 %). There were no other significant differences between AS and RA patients in illness perceptions (Table 2).

Participants with AS had better physical HRQoL (including experience of physical pain, incapacity to work and get around, and problems with energy and sleep) and better social relations HRQoL (i.e. less dissatisfaction with personal relationships, social support and sexual life) than their RA counterparts, but adjustment for confounders rendered these differences non-significant (Table 2). Mental (i.e. negative emotions like despair, believing that life is meaningless and feeling psychologically incapacitated) and environment HRQoL (i.e. feeling that one's environment is unsafe or unhealthy, lack of financial resources and lack of leisure opportunities), as well as overall HRQoL and general health were also similar in both diseases (Table 2).

Psychological distress, illness perceptions and physical HRQoL

Univariate analyses indicated that among illness perceptions, consequences, timeline, identity, illness concern and

Table 2 Psychological distress symptoms, illness perceptions and quality of life in ankylosing spondylitis (AS) and rheumatoid arthritis (RA)

	One-way ANOVA				ANCOVA adjusted for age, sex, years of education and medication			
	AS (N=55)	RA (N=199)	F	p	AS (N=55)	RA (N=199)	F	p
Psychological distress								
Anxiety	0.49±0.07	0.54±0.04	0.311	0.578	0.57±0.10	0.52±0.04	0.247	0.620
Depression	0.66±0.07	0.91±0.04	6.452	0.012 *	0.85±0.10	0.87±0.04	0.022	0.883
Somatization	0.84±0.10	0.90±0.05	0.267	0.606	1.09±0.12	0.84±0.05	2.851	0.093
Interpersonal sensitivity	0.63±0.07	0.70±0.04	0.631	0.428	0.70±0.10	0.69±0.04	0.009	0.925
Hostility	0.62±0.09	0.49±0.04	2.324	0.129	0.55±0.10	0.51±0.04	0.130	0.718
Phobic anxiety	0.27±0.05	0.28±0.03	0.041	0.841	0.35±0.08	0.27±0.03	0.874	0.351
Obsessive-compulsive	0.73±0.10	0.69±0.05	0.140	0.708	0.81±0.12	0.68±0.05	0.920	0.338
Paranoid ideation	0.80±0.09	0.66±0.05	1.564	0.212	0.86±0.11	0.66±0.05	2.112	0.147
Psychoticism	0.38±0.06	0.27±0.03	3.416	0.066	0.36±0.06	0.28±0.03	0.960	0.328
Illness perceptions								
Consequences	4.52±0.45	5.94±0.21	9.262	0.003 **	5.73±0.48	5.63±0.21	0.030	0.863
Timeline	8.96±0.27	8.88±0.17	0.049	0.824	9.41±0.38	8.74±0.17	2.169	0.142
Personal control	7.15±0.40	6.40±0.21	2.758	0.098	6.51±0.50	6.55±0.22	0.006	0.939
Treatment control	8.43±0.30	7.83±0.17	2.605	0.108	8.22±0.41	7.84±0.18	0.711	0.400
Identity	4.74±0.47	5.63±0.19	4.010	0.046 *	5.91±0.47	5.31±0.21	1.148	0.285
Illness concern	5.74±0.50	5.65±0.25	0.028	0.868	5.98±0.60	5.57±0.27	0.334	0.564
Comprehensibility	7.80±0.37	7.50±0.18	0.566	0.453	7.36±0.42	7.61±0.18	0.252	0.616
Emotions	5.28±0.45	5.97±0.24	1.782	0.183	5.64±0.58	5.88±0.26	0.130	0.718
Quality of life								
Physical	63.83±2.65	58.12±1.40	3.620	0.050 *	56.37±3.17	60.01±1.43	0.988	0.321
Mental	69.07±2.48	64.93±1.26	2.240	0.136	64.90±3.09	65.88±1.36	0.073	0.787
Social relations	67.32±2.68	60.14±1.55	4.696	0.031*	62.81±3.55	61.18±1.55	0.154	0.695
Environment	60.39±1.78	63.03±1.12	1.257	0.263	61.08±2.66	62.83±1.16	0.313	0.576
Overall QoL	62.27±30.38	62.37±24.2	0.001	0.980	61.02±4.33	62.90±1.95	0.135	0.714
General health	53.64±32.06	54.85±26.71	0.081	0.777	52.70±4.75	55.42±2.14	0.235	0.628
PHQ-9 total score	4.61±0.64	6.39±0.36	5.303	0.022 *	5.58±0.85	6.17±0.38	0.337	0.562

*p<0.05; **p<0.01

emotional response were significantly associated with physical HRQoL in both samples (Table 3). Preliminary stepwise multiple regression analyses with physical HRQoL as the dependent variable and all B-IPQ components as independent variables showed that the most significant correlates of physical HRQoL in both diseases were emotional response, consequences and illness concern (Table 4). Based on these results, emotional response, consequences and illness concern were selected for inclusion in the multivariate hierarchical analysis. However, emotional response scores showed high collinearity with SCL-90-R depression score, and it could not be included in the regression equations.

Table 5 shows that, in AS, demographic variables (model 1) and disease parameters (pain and BASDAI score—model 2) explained 38.2 % of the variance (p=0.001). Addition of illness perceptions (model 3) increased the variance by 12.9 % (p=0.001); B-IPQ illness concern was significantly associated with physical HRQoL; BASDAI scores remained significant, but pain severity was no longer significant. Addition of anxiety and depressive symptoms showed that they were not significantly associated with physical HRQoL (model 4). In the final model, illness severity and illness concern were the variables independently associated with AS patients' physical HRQoL.

A similar set of analyses in RA showed that demographic variables (model 1) and disease parameters (longer disease duration, more active disease and pain-model 2) explained 26.6 % of the variance (p<0.001) (Table 6). Addition of illness perceptions in model 3 increased the variance by 25.8 % (p=0.001); both B-IPQ consequences and illness concern were significantly associated with physical HRQoL, but disease duration was no longer significant. Addition of anxiety and depression added an additional

Table 3 Univariate comparisons between ankylosing spondylitis and rheumatoid arthritis patients' physical HRQoL and demographic, clinical and psychological variables studied

	Univariate comparisons with physical HRQoL (WHOQOL-BREF)	
	Ankylosing spondylitis (N=55)	Rheumatoid arthritis (N=199)
Age	−0.427 ***	−0.211 **
Gender	0.217	0.125
Education	0.409 **	0.272 ***
Disease duration	−0.302	−0.247 **
BASDAI	−0.608 ***	–
DAS-28	–	−0.167 **
Pain	−0.474 **	−0.598 ***
Psychological distress (SCL-90-R)		
Anxiety symptoms	−0.456 ***	−0.470 ***
Depressive symptoms	−0.478 ***	−0.596 ***
Illness perceptions (B-IPQ)		
Consequences	−0.640 ***	−0.679 ***
Timeline	−0.325 *	−0.367 ***
Personal control	0.249	0.239 ***
Treatment control	0.006	0.233 ***
Identity	−0.692 ***	−0.600 ***
Illness concern	−0.650***	−0.439 ***
Comprehensibility	0.040	0.058
Emotions	−0.726***	−0.489 ***

Values shown are beta regression coefficients based on univariate regression analyses with dependent variable the physical HRQoL

*p<0.05; **p<0.01; ***p<0.001

6.6 % (p<0.001). At this step, depressive symptoms were significantly associated with physical HRQoL, but disease activity was no longer significant (model 4). In the final model, pain, B-IPQ consequences and illness concern and SCL-90-R depressive symptoms were the significant independent correlates of RA patients' physical HRQoL.

Discussion

Our results showed a prevalence of clinically significant depressive symptoms of 14.8 % in AS patients, while an additional 25.9 % experienced mild depressive symptoms as measured by the PHQ-9. These rates were lower than those observed in RA (25.1 and 29.1 %, respectively), but adjustment for gender, age and educational level rendered the differences non-significant, confirming our first hypothesis and indicating that these differences could be attributed to socio-demographic factors. The RA sample, for example, comprised mostly women (82.4 %), whereas AS sample included mainly men (85.5 %) as anticipated [1], and a greater female prevalence of depression is a widely replicated epidemiological finding. Like others [8] we found that, in RA, both depressive symptoms and illness perceptions were significant independent correlates of physical HRQoL. Conversely, in the AS sample, the most prominent psychological construct independently associated with HRQoL was illness concern, while symptoms of anxiety and depression had a minor contribution to physical HRQoL. Thus, our second hypothesis was partially rejected; in AS, only illness perceptions were independently associated with HRQOL. Our findings also indicate that the effects of depression and illness perceptions on physical HRQoL are rather complex and differ between AS and RA, thereby confirming our third hypothesis.

The prevalence of clinically significant depressive symptoms in our AS sample (14.8 %) is lower than previously reported figures [13–15]. In a study with 62 AS patients [11], the prevalence of depression estimated by the ZDS was 27.4 %. Others found prevalence rates

Table 4 Preliminary stepwise multiple regression analyses with dependent variable the physical HRQoL and independent variables the 8 B-IPQ components separately in ankylosing spondylitis (N=55) and rheumatoid arthritis (N=199) patient samples

	Ankylosing spondylitis		Rheumatoid arthritis	
	beta	p value	beta	p value
Illness perceptions (B-IPQ)				
Emotions	−0.447	<.001	−0.043	.578
Illness concern	−0.421	<.001	−0.185	.009
Consequences	−0.333	.019	−0.447	<.001
Identity	−0.096	.161	−0.142	.012
Personal control	0.139	.123	0.082	.115
Treatment control	−0.108	.267	0.016	.774
Timeline	−0.099	.388	−0.127	.018
Comprehensibility	0.018	.924	0.071	.130
Regression statistics	R^2_{Adj}=0.507, p=.019		R^2_{Adj}=0.511, p<.001	

Table 5 Hierarchical models of the factors associated with the physical HRQoL in ankylosing spondylitis patients (N=55)

	Model 1	Model 2	Model 3	Model 4
Demographics				
Age, years	−0.321 *	−0.115	−0.021	0.001
Education	0.293 *	0.264 *	0.152	0.151
Disease parameters				
BASDAI score	–	−0.334 **	−0.306 **	−0.264 *
Pain (VAS-Pain)	–	−0.264 *	−0.142	−0.128
Illness perceptions				
Consequences	–	–	−0.112	−0.057
Illness concern	–		−0.371 ***	−0.370 ***
Psychological distress				
Depressive symptoms (SCL-90-R)	–	–	–	−0.066
Anxiety symptoms (SCL-90-R)	–	–	–	−0.071
Adjusted R^2 of model	0.228	0.382	0.512	0.520
Incremental adjusted R^2	0.228	0.154	0.129	0.008
Significance of F change	<0.01	0.001	0.001	0.553

Independent variables were sequentially entered in linear regression models in which the dependent variable was the physical HRQoL. Values shown are standardized (beta) regression coefficients

PASI Psoriasis Area and Severity Index

*p<0.05; **p<0.01; ***p<0.001

of 39.8 % [42] and up to 55.5 % [43], measured with the Hospital Anxiety and Depression Scale [44] in Turkish and Moroccan AS patients, respectively. The different instruments and cutoffs used for assessing 'depression' and the demographic diversities among studies may explain these differences, which underscore the need for studies using structured interviews for assessing MDD in AS. It is worth noting that the prevalence of depressive symptoms in our AS sample rises up to 40.7 % if patients with 'mild' depressive symptoms are considered. Additionally, no AS patient had received treatment for a depressive illness. These findings highlight the under-recognition and under-treatment of depression among rheumatologic patients, and should encourage rheumatologists to assess psychological distress symptoms as an important step in the care of AS patients.

We also found that AS patients had better physical and social relations HRQoL than RA patients, but adjustment for demographic variables rendered these differences non-significant. Overall HRQoL, general health and mental and environment HRQoL were similar in

Table 6 Hierarchical models of the factors associated with the physical HRQoL in rheumatoid arthritis patients (N=199)

	Model 1	Model 2	Model 3	Model 4
Demographics				
Age, years	−0.058	−0.048	−0.103	−0.077
Education	0.231 **	0.142	0.075	0.081
Disease parameters				
DAS-28	–	−0.189 ***	−0.111 *	−0.073
Disease duration	–	−0.134 *	−0.048	−0.064
Pain (VAS Pain)	–	−0.425 ***	−0.199 ***	−0.182 ***
Illness perceptions				
Consequences	–	–	−0.441 ***	−0.314 ***
Illness concern	–	–	−0.226 **	−0.146 **
Psychological distress				
Anxiety symptoms (SCL-90-R)	–	–	–	−0.087
Depressive symptoms (SCL-90-R)	–	–	–	−0.250 ***
Adjusted R^2 of model	0.065	0.266	0.524	0.590
Incremental adjusted R^2	0.065	0.201	0.258	0.066
Significance of F change	0.001	0.001	0.001	0.001

Independent variables were sequentially entered in linear regression models in which the dependent variable was the physical HRQoL Values shown are standardized (beta) regression coefficients

DAS-28 Disease activity for 28-joint indices score

*p<0.05; **p<0.01; ***p<0.001

both disorders. Other studies found that RA patients presented worse physical but better mental HRQoL than AS patients [5, 6]. Demographic diversities among studies may explain also these differences since direct comparison of the consequences of RA and AS is difficult due to inherently different age and sex distributions [23]. Cultural differences may also exist: a previous study found meaningful differences in AS patients' HRQoL across three European countries [4]. Nevertheless, our findings are consistent with the conclusion of Zink et al. [24] that RA and AS have similar detrimental impacts on well-being.

Our main new finding that AS patients' physical HRQoL was associated with illness concern (i.e. the degree that patients are concerned about their illness) but not with depressive symptoms, in contrast with RA where depressive symptoms and illness consequences (i.e. the degree that patients believe that the illness affect their life) were equally major correlates, indicates that, in AS, cognitive illness representations may play a major role, greater than symptoms of psychological distress. It is possible that AS patients worry about the more severe forms of the disease leading to limited neck movement, increased stiffness of the entire spine, loss of normal posture and development of thoracic kyphosis, disabilities that do not occur to the same extent in RA. The importance of illness concerns is underlined by evidence strongly associating this component with slower return to work following a sick leave [32] given also that the impact of AS on employment and work disability is considerable [3]. To our knowledge, this is the first study to assess illness perceptions and psychological distress in relation to HRQoL in AS. These novel findings may contribute to a better understanding of the factors associated with impaired physical HRQoL in AS and may lead to a better appreciation and management of these treatable aspects of HRQoL.

This study's main limitation is its cross-sectional design which prevents solid cause–effect inferences. The generalizability of our findings is also limited by the relatively small AS sample. However, we recruited a remarkable proportion of AS patients with a high response rate (84.6 %), given that between 1983 and 2002, 113 AS cases were diagnosed in our catchment area [2]. Nevertheless, our findings need to be replicated in prospective studies with larger samples. Another drawback is the use of self-report measures only; since depression can only be diagnosed by a structured interview, studies using such interviews are needed to confirm our findings. It is also possible that factors not included here, such as the patients' defensive profile, spirituality or social support, may have interfered with the results. Finally, since in B-IPQ only one item is used per 'subscale', B-IPQ might be inherently less reliable than the full-length instrument IPQ or IPQ-R. Thus, studies using the full-length inventory are awaited to confirm our findings.

The main clinical implication of our study is that, apart from recognition and treatment of depression clinicians should also consider AS patients' illness perceptions since we found that they could be important predictors of outcome in AS. Since depressive symptoms are frequent in rheumatologic disorders, most studies examining psychological correlates of health outcomes focus on depression, but illness perceptions should not be overlooked. Therefore, clinicians should also assess AS patients' illness representations and refer them for psychotherapeutic interventions. B-IPQ may be a useful and time-efficient tool for rheumatologists to assess illness representations in order to prevent further deterioration of AS patients' HRQoL.

Our findings generate relevant hypothesis. For instance, the use of antidepressants and/or more insight-oriented psychotherapies is justified for RA patients given their psychologically oriented causal attributions and the role that depression plays in outcome. Conversely, cognitive behavioural therapy (CBT) targeting illness cognitions might be more effective for AS patients. Evidence suggests that, in patients with arthritis, CBT can change illness representations resulting in better outcomes [45]. It should be noted, however, that any psychological intervention should only be provided after a thorough psychiatric evaluation. Moreover, when HRQoL is assessed, specific psychological distress measurements should be used too, in order to detect the influence of psychopathology on HRQOL. Our findings call also for additional investigation into the specific paths that form AS patients' HRQoL and for clinical psychotherapeutic trials targeting illness representations in AS in order to help rheumatologists and consultation-liaison psychiatrists to schedule proper therapeutic interventions targeting AS patients' HRQoL.

Disclosures None.

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