Correlation of Axial Spondyloarthritis with Anxiety and Depression

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Background: This study compared anxiety and depression in patients with nonradiographic axial spondyloarthritis (nr-axSpA) versus patients with ankylosing spondylitis (AS), and examined the relationship between clinical characteristics and psychological status.

Material/Methods: Patients diagnosed with axial spondyloarthritis (axSpA) were recruited for the study. Disease status was evaluated by the bath ankylosing spondylitis disease activity index (BASDAI), the bath ankylosing spondylitis functional index, visual analog scale, and the level of inflammatory markers. Psychological status was evaluated by the self-rating anxiety scale (SAS) and the self-rating depression scale (SDS).

Results: Sixty patients with axSpA were enrolled in the study, including 40 patients with AS and 20 patients with nr-axSpA. Patients with AS and patients with nr-axSpA had similar disease status and psychological status. Anxiety was significantly associated with disease status and SDS score ($P<0.05$ for all), whereas BASDAI (odds ratio [OR]=0.28, 95% CI=0.08–0.97, $P=0.045$) and SDS (OR=0.90, 95% CI=0.82–0.98, $P=0.014$) protected against anxiety. Depression was obviously correlated with smoking history, disease status, and SAS score ($P<0.05$ for all). Smoking history (OR=10.18, 95% CI=1.23–84.23, $P=0.031$) and SAS score (OR=0.85, 95% CI=0.75–0.97, $P=0.014$) were negatively correlated with risk of depression.

Conclusions: Patients with AS and patients with nr-axSpA had similar psychological status in terms of anxiety and depression. Disease status and smoking were significantly correlated with psychological status. Patients with higher SAS scores were more likely to have depression. The results of this study may be helpful to clinically guide psychological interventions for patients with axSpA.

MeSH Keywords: Anxiety • Depression • Spondylitis, Ankylosing

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Background

Axial spondyloarthritis (axSpA) is a chronic inflammatory rheumatic disease characterized by chronic low back pain and primary involvement of the axial skeleton [1,2]. According to the classification criteria of the Assessment of Spondyloarthritis International Society (ASAS), the 2 major types of axSpA are nonradiographic axial spondyloarthritis (nr-axSpA) and ankylosing spondylitis (AS) [3]. Although not life-threatening, axSpA has adverse effects on the patient's quality of life and work productivity [4,5]. The disease onset is early adulthood, usually before age 45, and the disease may last for the rest of the patient's life. Patients with axSpA have a poor quality of life and reduced life expectancy, and there are no effective strategies for treatment [6].

Recently, psychological disorders such as anxiety and depression have been frequently reported in patients with axSpA. Hakkou et al. reported that more than half of the patients with axSpA experienced depression or anxiety [7]. The mechanism that leads to poor psychological status in patients with axSpA is not completely understood. The risk factors for the occurrence of anxiety and depression in patients with axSpA have been analyzed. A study conducted by Baysal et al. showed that disease activity and quality of life were risk factors for poor psychological status in patients with axSpA [8]. A study conducted by Kilic et al. demonstrated that education level, disease activity, and quality of life were risk factors for anxiety and depression in patients with axSpA [9]. However, the psychological status of patients in the AS group versus that of patients in the nr-axSpA group have rarely been compared in previous studies.

The purpose of the current study was to evaluate the risk factors for anxiety and depression in patients diagnosed with axSpA, including those with AS and nr-axSpA. The relationship between clinical characteristics and mood disorders (anxiety and depression) in patients with AS and nr-axSpA was analyzed. Multivariate logistic regression analysis was applied to determine the effects of patient characteristics on risk of anxiety or depression in the study population. The current study may be helpful in guiding psychological intervention, thus improving psychological status of patients with axSpA.

Material and Methods

Patients

Patients diagnosed with axSpA from April 2014 to May 2015 were recruited to the current study in the Southwest Hospital of Third Military Medical University, Chongqing, China. This study was approved by the ethics committee of that hospital.

Patients enrolled in the current study met the following criteria:
1. All patients were diagnosed with axSpA, according to the 2009 ASAS criteria [10].
2. All patients were evaluated for evidence of radiographic sacroiliitis, based on the modified New York criteria.
3. All patients were age 18 years or older.

Patients with the following conditions were excluded from the study:
1. Another immune inflammatory disease.
2. Poor psychiatric history.
3. Use of psychotropic substances within 3 months.

All patients signed informed consent forms.

All assessments, including the anthropometric measurements, were done by the same physician. Clinical assessments, blood specimens, and questionnaires were done at the beginning of the study. Erythrocyte sedimentation rate (ESR) was detected by classic Westergren method (MicroSED-10® System, Electa Lab, Italy); turbidimetric inhibition immunoassay (QuikRead® 101 CRP analyzer, Orion Diagnostica Oy, Finland) was applied to investigate the level of C-reactive protein (CRP) in blood specimens. All of the testing progress were according to the manufacturers' instructions.

Evaluation for diseases status

Disease activity was evaluated by the bath ankylosing spondylitis disease activity index (BASDAI) (0–10, cut-off point 4) [11]. The bath ankylosing spondylitis functional index (BASFI) (0–10, cut-off point 2.1) was used to assess the functional status of the patients [12]. The visual analog scale (VAS) was applied to pain intensity in patients (0–10, cut-off point 3). We also evaluated ESR (cut-off points 15 mm/h for male and 20 mm/h for female), CRP (0.8–8 mg/L in healthy people), AS disease activity score (ASDAS)-ESR, and ASDAS-CRP in patients diagnosed with axSpA.

Psychological status assessment

The psychological status of the recruited patients was evaluated according to the Zung self-rating anxiety scale (SAS) and self-rating depression scale (SDS) [13,14]. The SAS has 20 questions, with the scaled score range of 0 to 100. Patients whose SAS score was >50 were diagnosed with anxiety. The SDS has 20 questions, with the standard score range of 0 to 100. Patients whose SDS score was greater than the critical value of 53 were likely to have more severe symptoms.

Statistical analysis

Statistical analysis was performed in SPSS 18.0 software. The continuous variables were shown as mean ±SD, and analyzed

Table 1. Comparison for the demographic and clinical characteristics between AS and nr-axSpA group.

Features	Total	AS group (n=40)	nr-axSpA group (n=20)	χ^2/t	P value
Age (mean ±SD) (year)	31.77±10.11	31.48±10.13	32.36±10.29	0.343	0.755
Gender				0.628	0.409
Male	44	28	16		
Female	16	12	4		
Smoking history				0.136	0.713
Yes	26	18	8		
No	34	22	12		
ESR (mean ±SD) (mm/h)	22.33±19.87	21.07±19.16	24.85±21.52	−0.730	0.493
CRP (mean ±SD) (mg/L)	18.98±18.80	17.44±17.54	22.05±21.23	−0.674	0.375
BASFI (mean ±SD)	1.98±1.98	1.75±1.90	2.44±2.11	1.231	0.204
BASDAI (mean ±SD)	3.38±1.90	3.24±2.00	3.67±1.69	−0.964	0.409
VAS (mean ±SD)	4.05±1.93	4.02±2.02	4.10±1.77	−0.317	0.888
ASDAS-CRP (mean ±SD)	2.80±0.99	2.75±1.04	2.90±0.90	−0.485	0.583
ASDAS-ESR (mean ±SD)	2.48±0.91	2.42±0.97	2.58±0.80	−0.675	0.530
SAS (mean ±SD)	45.82±9.62	44.25±9.41	48.95±9.48	−1.831	0.074
SDS (mean ±SD)	50.08±1.69	50.22±13.39	49.80±12.74	−0.163	0.907

P value, comparison between AS group and nr-axSpA group. Smoking, consumed more than one cigarette per day and last more than 6 months.

by t test. Chi-square analysis was applied for dichotomous variables (i.e., qualitative data). Additionally, multivariate logistic regression analysis was used to detect the roles of depression or anxiety in patients diagnosed with axSpA. $P<0.05$ indicated significant difference.

Results

Demographic and clinical characteristics of the patient population

Sixty patients diagnosed with axSpA were enrolled in the current study. The patient population included 44 men and 16 women; average age was 31.77±10.11 years. A total of 40 patients were diagnosed with AS and 20 patients with nr-axSpA. The characteristics of the study subjects, including CRP and ESR levels and BASFI, BASDAI, VAS, ASDAS-CRP, ASDAS-ESR, SAS, and SDS results, are listed in Table 1.

Differences between patients with AS and patients with nr-axSpA

We compared baseline characteristics between patients with AS and patients with nr-axSpA. The results listed in Table 1

indicated that distributions of age, sex, and smoking history were similar between the AS and nr-axSpA groups ($P>0.05$ for all). Clinical characteristics, such as CRP and ESR levels and BASFI, BASDAI, VAS, ASDAS-CRP, and ASDAS-ESR results, were not associated with AS or nr-axSpA ($P>0.05$ for all). In addition, the burdens of anxiety and depression were similar between patients with AS and patients with nr-axSpA ($P>0.05$ for all).

Relationship between clinical characteristics and anxiety

We compared the clinical differences between patients with SAS score ≥50 and patients SAS score <50. Twenty-four patients had SAS scores >50, and 36 had SAS scores <50. Comparison results indicated that BASFI ($P=0.002$), BASDAI ($P=0.000$), and SDS ($P=0.000$) were significantly associated with occurrence of anxiety in patients with axSpA. However, age; sex; smoking history; results of ASDAS-CRP, ASDAS-ESR, and VAS; and type of axSpA were not correlated with anxiety occurrence in patients with axSpA ($P>0.05$ for all; Table 2).

Relationship between clinical characteristics and depression

Patients with SDS score over 53 were diagnosed with depression. In the present study, 26 patients were diagnosed with

Table 2. Relationship between anxiety grade and clinical characteristics in patients diagnosed with axSpA.

Characteristics	SAS ≥50 (n=24)	SAS <50 (n=36)	χ^2/t	P value
Age	32.08±11.06	31.56±9.58	0.199	0.845
Gender			0.696	0.404
Male	19	25		
Female	5	11		
Smoking history			1.912	0.167
Yes	13	13		
No	11	23		
ESR (mm/h)	19.58±16.33	24.17±21.95	0.871	0.386
CRP (mg/L)	16.31±16.17	20.75±20.38	−0.826	0.375
BASFI	2.91±2.08	1.36±1.67	−3.253	0.002
BASDAI	4.72±1.74	2.49±1.45	−3.882	0.000
VAS	4.29±1.97	3.89±1.91	−0.851	0.432
ASDAS-CRP	3.08±1.03	2.62±0.93	−1.649	0.075
ASDAS-ESR	2.73±0.92	2.31±0.89	−1.729	0.083
SDS	59.33±10.22	43.92±11.02	−4.237	0.000
Types of axSpA			1.250	0.264
AS	14	26		
nr-axSpA	10	10		

depression. Analysis results demonstrated that the incidence of depression in patients with axSpA was significantly correlated with smoking history (*P*=0.003), BASFI (*P*=0.005), BASDAI (*P*=0.000), and SAS score (*P*=0.000). Moreover, age; sex; results of ESR, CRP, ASDAS-CRP, ASDAS-ESR, and VAS; and type of axSpA were not significantly correlated with depression occurrence in patients with axSpA (*P*>0.05 for all; Table 3).

Risk factors for anxiety and depression

Logistic regression analysis was applied for analysis of the relationship between AS characteristics and the risk of anxiety and depression in the study population. Analysis for anxiety risk indicated that SDS (OR=0.90, 95%CI=0.82–0.98, *P*=0.014) and BASFI (OR=0.28, 95%CI=0.08–0.97, *P*=0.045) were significantly associated with anxiety in patients with axSpA (Table 4).

The results also showed that smoking history (OR=10.18, 95% CI=1.23–84.23, *P*=0.031) and SAS score (OR=0.85, 95%CI=0.75–0.97, *P*=0.014) were distinctly correlated with occurrence of depression in study population (Table 5).

Discussion

The current study was conducted to evaluate the differences in burden of anxiety and depression in patients diagnosed with axSpA, as well as the risk factors for anxiety and depression. Analysis of our results indicated that the incidence of anxiety and depression was similar between patients with AS and patients with nr-axSpA. BASFI, BASDAI, and SDS score were significantly correlated with burden of anxiety. The occurrence of depression was significantly associated with smoking history and BASFI, BASDAI, and SAS scores. We found that the clinical characteristics significantly were similar in the AS and nr-axSpA groups. This conclusion was different from those of previous studies. Indexes such as gender and CRP are different significantly between AS and nr-axSpA patients [15–18]. This will need to be verified by more randomized controlled trials.

Anxiety and depression are common psychiatric abnormalities. Both disorders are treated with selective serotonin reuptake inhibitors, serotonin-norepinephrine reuptake inhibitors, and tricyclic antidepressants [19,20]. These disorders and their treatment affect quality of life, especially for patients with comorbidities [21–24]. Patients in both subgroups had back pain, which may cause both anxiety and depression. We found no

Table 3. Association between depression grade and clinical features in patients with axSpA.

Characteristics	SDS ≥53 (n=26)	SDS <53 (n=34)	χ^2/t	P value
Age	32.04±12.24	31.56±8.31	−0.219	0.857
Gender			2.986	0.084
Male	22	22		
Female	4	12		
Smoking history			9.086	0.003
Yes	17	9		
No	9	25		
ESR (mm/h)	20.65±16.19	23.62±22.44	−0.523	0.571
CRP (mg/L)	17.42±15.68	20.16±21.02	0.443	0.580
BASFI	2.79±1.97	1.36±1.78	−2.949	0.005
BASDAI	4.44±1.82	2.58±1.55	−4.205	0.000
VAS	4.42±1.90	3.76±1.92	−1.321	0.192
ASDAS-CRP	3.07±0.98	2.59±0.96	−1.948	0.062
ASDAS-ESR	2.73±0.93	2.29±0.87	−1.807	0.065
SDS	52.08±8.46	41.03±7.53	−3.552	0.000
Types of axSpA			0.034	0.854
AS	17	23		
nr-axSpA	9	11		

Table 4. Logistic analysis for the factors related anxiety risk in study subjects.

Factors	OR	95% CI	P
Gender	3.23	0.13–82.54	0.479
Age	1.03	0.92–1.15	0.663
Types of axSpA	0.42	0.61–2.94	0.384
Smoking history	0.56	0.052–6.00	0.629
ESR	1.00	0.89–1.13	0.945
CRP	1.02	0.92–1.13	0.760
BASFI	0.80	0.36–1.78	0.577
BASDAI	0.28	0.08–0.97	0.045
VAS	1.03	0.48–2.22	0.937
ASDAS-CRP	3.32	0.07–158.03	0.542
ASDAS-ESR	1.21	0.02–64.01	0.926
SDS	0.90	0.82–0.98	0.014

significant difference between the SAS and SDS scores in the AS and axSpA groups. Compared with those in the AS group, patients in the nr-axSpA group had higher SAS scores and lower SDS scores; but all mean scores were lower than the cutoff points. These results indicated that the stages of anxiety and depression were not higher in patients with these disorders, and there was no significant difference between the 2 groups. In the stratified analysis, we proved that BASFI and BASDAI values were significantly correlated with burden of anxiety and depression in patients diagnosed with axSpA.

Table 5. Analysis for the risk factors of depression in patients diagnosed with axSpA.

Factors	OR	95% CI	P
Gender	15.96	0.86–294.59	0.063
Age	1.06	0.96–1.17	0.241
Types of axSpA	2.33	0.34–15.82	0.286
Smoking history	10.18	1.23–84.23	0.031
ESR	1.03	0.90–1.18	0.687
CRP	0.97	0.88–1.08	0.640
BASFI	0.86	0.44–1.66	0.648
BASDAI	0.49	0.15–1.60	0.237
VAS	0.77	0.41–1.48	0.437
ASDAS-CRP	23.04	0.55–969.03	0.100
ASDAS-ESR	0.19	0.004–8.80	0.394
SAS	0.85	0.74–0.97	0.014

Logistic regression showed that BASDAI was distinctly correlated with anxiety but not with depression. This conclusion is in accordance with the previous investigation. We also proved that patients with higher SAS scores were more likely to have lower SDS scores.

In the current study we found that smoking history was significantly correlated with, and a risk factor for, depression. Living habits may influence psychiatric status. A study by Hou et al. proved that a history of alcohol use was correlated with SAS and SDS scores in patients diagnosed with end-stage renal disease receiving maintenance hemodialysis [25]. Rodriguez et al. proved that smoking cessation was related to a decrease in depressive symptoms, and relapse was related to an increase of such symptoms [26]. Smoking status is positively correlated with depression and anxiety [27–29]. Smoking cessation may be a useful way to prevent occurrence of anxiety and depression in patients with axSpA. However, a meta-analysis indicated that smoking had no significant association with the development of depression and anxiety [30]. These results are inconsistent and differ from the results of the current study. These inconsistencies may be caused by different sample sizes, ethnicity, region of residence, or other factors. The small sample size of the current study might have led to different results regarding anxiety and depression.

Conclusions

Patients with AS and nr-axSpA had similar demographic and clinical characteristics. Both BASDAI and BASFI were significantly associated with the level of anxiety and depression in patients with axSpA; smoking was related to depression only in this population. BASDAI was significantly correlated with the development of anxiety but not with the development of depression. In addition, we found an obvious association between high SAS scores and risk of depression. This study may provide guidance for psychological intervention for patients with axSpA, thus helping to prevent the development of psychological disorders.

The present study has certain limitations. First, the small sample size might have contributed to the low test power of this study. Second, participants were all of the same race. Third, confounding factors were not considered in this study. Therefore, further studies should be carried out to confirm the present results.

Disclosure statement

None.

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