COEXISTING OF FIBROMYALGIA SYNDROME AND ANKYLOSING SPONDYLITIS

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ABSTRACT

Objective*: Fibromyalgia syndrome (FMS) is characterized by diffuse pain and tenderness at palpation of specific points in musculoskeletal system. FMS can associate to rheumatic diseases such as ankylosing spondylitis (AS). The aim of the present study was to evaluate the effects of a coexisting of FMS on disease-related parameters in patients with AS.*

Materials and methods*: The patients diagnosed with AS according to modified New York criteria were included into the study. All the participants were assessed by: Bath Ankylosing Spondylitis Functional Index (BASFI), Bath Ankylosing Spondylitis Disease Activity Index (BASDAI), Bath Ankylosing Spondylitis Metrology Index (BASMI), Fibromyalgia Impact Questionnaire (FIQ), Beck Depression Inventory (BDI) and Ankylosing Spondylitis Quality of Life (ASQOL) scale. The ACR (American College of Rheumatology) 1990 criteria were used to diagnose FMS.*

Results*: Of the patients included (n=71), thirteen patients (8 women and 5 men, 16.9 %) met ACR criteria for FMS. Higher BASDAI and ASQOL scores were recorded in AS patients with coexisting FMS compared to those without (p=0.002 and p=0.009, respectively). However, there was no significant difference in BASFI, BASMI, FIQ and BDI scores between AS patients with or without coexisting FMS (p=0.674).*

Conclusion*: In the present study, it should be suggested that the presence of coexisting FMS in patients with AS causes higher disease activity and poorer quality of life. Thus, the disease activity and quality of life should be interpreted by taking the likelihood of FMS into consideration.*

Key words*: Ankylosing spondylitis, fibromyalgia syndrome, coexisting.*

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Introduction

Ankylosing spondylitis (AS) is the prototype of disorders termed as spondyloarthropathies. It is a chronic disease characterized by inflammation of sacroiliac joints and/or spine. This disease can be accompanied by other musculoskeletal involvements such as peripheral arthritis, enthesitis as well as symptoms of ocular, cardiac and gastrointestinal system involvements. The typical symptom of the disease is inflammatory low back pain and there may be stiffness and limitation at spine due to axial skeleton involvement. The patients deal with pain, decreased physical activity and poor quality of life[(1)].

Fibromyalgia syndrome (FMS) is one of a group of disease including chronic fatigue syndrome or posttraumatic stress disorders, termed as "central sensitization syndromes". It is a chronic disease characterized by diffuse musculoskeletal pain. Fatigue, sleep disorders, stiffness, depression, anxiety, headache, and paraesthesia are usually seen in this syndrome. It mainly affects female patients[(2, 3)].

It has been shown that the association of FMS with other rheumatic diseases such as rheumatoid arthritis, psoriatic arthritis, systemic lupus erythematous and Crohn diseases has been shown[(4)]. AS and FMS share several common symptoms such as chronic low back pain, morning stiffness, fatigue, depression and sleep disorders. Thus, AS may

obscure the presence of FMS. However, there are limited numbers of trials investigating the relationship between AS and FMS. In these studies, FMS frequency varies from 4% to 50% among women with AS, while it is 0-45% among men[5-7].

In the shed of above-mentioned information, we aimed to evaluate the FMS frequency in AS patients and the effects of a coexisting FMS on AS-related parameters such as functional capacity, disease activity, spinal mobility, and quality of life.

Materials and methods

Patients diagnosed with AS according to modified New York criteria[8] were included into the study. The study population was derived form the patient population of the physical medicine and rehabilitation department of Afyon Kocatepe University Hospital. The presence of an additional chronic disease including other rheumatic diseases, use of antidepressants or similar agents, abnormal results in laboratory evaluations including complete blood count, biochemical tests and thyroid function tests were accepted as exclusion criteria. All patients were informed about the details of the study. Written informed consents were obtained.

The demographic characteristics including age, gender, weight, height, marital status, and occupation were recorded. The body mass index (BMI) was calculated as body weight (kilograms) divided by squared height (meters) and its results were construed as reported by clinical guideline[9]. Data regarding duration of disease, medication and practice of home-based exercise training program including classic breathing and posture exercises for patients with AS were recorded.

Outcomes measurements were functional capacity, disease activity, spinal mobility, quality of life, and depression. Functional capacity and disease activity were assessed using Turkish versions of Bath AS Functional Index (BASFI) and Bath AS Disease Activity Index (BASDAI)[10, 11]. BASFI consists from items addressing activities which aim to evaluate functional anatomy and coping with daily living activities. BASDAI consists of items addressing low back pain, fatigue, peripheral joint pain and swelling, localized tenderness, duration, and severity of morning stiffness[12]. Both indices were scored by using visual analogue scale (VAS)[13]. In both indices, higher total scores suggest impairment in functional capacity or increase in disease activity. The cut-off value is accepted as 4 in BASDAI scale. The scores above cut-off value indicate more active disease. Spinal mobility was assessed by using Bath AS Metrology Index (BASMI). BASMI gives information about the measurements of cervical rotation, tragus-wall distance, lumbar flexion, lumbar lateral flexion and intermalleolar distance. Higher scores indicate increased involvement of spinal mobility[12].

ASQOL scale was used to assess quality of life. ASQOL is a scale questioning the effects of disease on sleep, mood, motivation, coping skills, daily living activities, independence, relations and social life. Higher scores indicate poor quality of life[12].

The presence of depression was evaluated by using Beck Depression Inventory[14]. The validity and reliability of the scale in Turkish was previously shown[15]. BDI is consisted of questions addressing physical, emotional and cognitive symptoms. Higher total scores indicate more severe depression. Total scores are interpreted as follows: 0-4 points as none or minimal; 5-9 points as mild; ≥ 10 points as moderate.

After completion of outcome measurements, all patients were assessed for the presence of coexisting FMS. In patients with AS, FMS diagnosis was made by using 1990 ACR criteria[16]. According to 1990 ACR criteria were diagnosed as FMS. The number of tender points (NTP) was determined by digital palpation method. In this method, approximately 4 kg/cm2 pressure was applied to points located at occipital region, lower cervical region, trapezius, and supraspinatus muscles, second rib, lateral epicondyle, gluteal region, greater trochanter and medial region of the knee until thumb becomes white.

The Fibromyalgia Impact Questionnaire (FIQ), developed by Burckhardt et al[17], was used to assess the disease-related failure in daily living activities. The validity and reliability of the scale in Turkish was previously shown[18]. By using the scale, physical functional capacity, disease-related involvement, and the difficulties in working, pain, fatigue, morning tiredness, stiffness, anxiety and depression were assessed. In the scale with total score of 100 points, scores of 50-70 points were considered as mild involvement, while scores of 70 points or higher were considered as severe involvement[19].

All analyses were performed using the SPSS for Windows 18.0 software program. Demographic data and outcome measurements in patients with

AS were analyzed by One sample t-test. To compare the data including age, body mass index, disease duration, BASFI, BASDAI, BASMI, ASQOL, BDI, VAS, NTP, and FIQ in patients with coexisting FMS and without coexisting FMS, Independent sample t-test was used. Chi-squared test was used for caterogical variables. P values <0.05 were considered statistically significant.

Results

Overall, 77 patients were included into the study. Of the patients included, 61 (79.2%) were male and 16 (20.8%) were female. Mean age was 37.96±12.17 years. Of the patients, 16 (20.8%) were single, while 61 (79.2%) were married. When occupational status was evaluated, it was found that there were 5 students (6.5%), 15 housewives (19.5%), 21 unemployed individuals (27.3%) and 36 working individuals (46.8%). Mean BMI was 25.93±4.80 kg/m2. Mean disease duration was 10.4±8.9 years. Of the patients included, 56 (72.7%) were on non-steroidal anti-inflammatory drug therapy, while 39 (50.6%) were on salazopyrine, 3 (3.9%) on methotrexate, 13 (16.9%) on infliximab, 12 (15.6%) on etanercept and 4 (5.2%) on adalimumab therapy. While 41 patients (53.2%) were performing home-based exercise training, 36 patients (46.8%) didn't. The demographic characteristics of the patients were summarized in Table 1.

In the clinical examination, mean BASFI score was 3.40±2.56 while mean BASDAI score was 3.59±1.99. According to these values, there was no marked limitation in functional capacity in the patients and disease activity was low. Mean BASMI score was 3.15±2.23, indicating that there was no marked limitation in spinal mobility. Mean ASQOL and BDI scores were 8.93±5.51 and 17.71±13.57, respectively. According to these scores, patients had moderate quality of life and depression level. Mean VAS scores and NTP were 4.81±2.60 and 4.33±4.72, respectively. Mean FIQ score was 46.84±22.73, indicating that the daily living activities were mildly affected. Table 2 presents clinical characteristics of the patients.

Of the patients, 16.9% (n=13; 8 women and 5 men) met ACR criteria for FMS. In the patients diagnosed as FMS, mean age was 37.15±12.48 years, while mean BMI was 24.38±3.92 kg/m2 and mean disease duration was 9.46±8.42 years. Of the patients with FMS, 15.3% were performing regular exercises. A significant difference was detected

	n (%)
Participants	77
Female	16 (20.8 %)
Male	61 (79.2 %)
Maritual Status	
Married	61 (79.2 %)
Single	16 (20.8 %)
Occupation	
Student	5 (6.5 %)
Housewife	15 (19.5 %)
Working	21 (27.3 %)
Non-working	36 (46.8 %)
Mean age (years) ±SD	37.96±12.17
Body mass index(kg/m2) ±SD	25.93±4.80
Mean disease duration (years) ±SD	10.44±8.93
Medication	
Non-steroidal anti-inflammatory drugs	56 (72.7 %)
Salazopyrine	39 (50.6 %)
Methotrexate	3 (3.9 %)
İnfliximab	13 (16.9 %)
Etanercept	12 (15.6 %)
Adalimumab	4 (5.2 %)
Performing home based exercise	
Regular	41 (53.2 %)
Nonregular or no practice	36 (46.8 %)

Table I: Demographic features of patients with ankylosing spondylitis.

	Mean ±standart deviation (SD)
BASFI	3.40±2.56
BASDAI	3.59±1.99
BASMI	3.15±2.13
ASQOL	8.93±5.51
BDI	17.71±13.57
VAS (cm)	4.18±2.60
NTP	4.33±4.72
FIQ	46.84±22.73

Table II: Outcome measurements of patients with ankylosing spondylitis.

BASFI: Bath Ankylosing Spondylitis Functional Index, BASDAI: Bath Ankylosing Spondylitis Disease Activity Index, BASMI: Bath Ankylosing Spondylitis Metrology Index, ASQOL: Ankylosing Spondylitis Quality of Life BDI: Beck Depression Index, VAS: Visual Analogue Scale, NTP: Number of tender points, FIQ: Fibromyalgia Impact Questionnaire

2among patients with and without coexisting FMS regarding gender and practice of regular exercises (p=0.001 and p=0.003, respectively). For the disease-related parameters, higher VAS, NTP, BASDAI, and ASQOL scores were recorded in AS patients diagnosed as FMS compared to those without coexisting FMS (p=0.001, p=0.001, p=0.022 and p= 0.009, respectively). However, there was no significant difference in BASFI, BASMI, BDI and FIQ scores between AS patients with and without coexisting FMS (p= 0.274, p=0.101, p=0.693 and p= 0.061, respectively). Table 3 summarizes the demographic characteristics according to the coexisting FMS in patients with AS and the effects of FMS on disease-related parameters.

	patients with FMS n=13 (%16,9)	patients without FMS n= 64 (%83,1)	*p* value*
Female/male ratio (n)	8:5	8:56	0.001*
Age (mean± SD) (years)	37.15±12.48	38.12±12.20	0.795
Body Mass Index (mean± SD) (kgr/m2)	24.38±3.92	26.25±4.93	0.204
Disease duration (mean± SD) (yıl)	9.46±8.42	10.65±9.09	0.664
Patients performing exercise (n,%)	2/13 (15.3%)	38/64 (59.37%)	0.003*
BASFI	4.11±1.85	3.25±2.68	0.274
BASDAI	4.73±2.13	3.35±1.90	0.022*
BASMI	2.23±1.96	3.34±2.25	0.101
ASQOL	11.00±4.54	6.49±2.63	0.009*
BDI	19.07±11.75	17.42±13.98	0.693
VAS (cm)	6.23±1.64	3.76±2.57	0.001*
NTP	13.07±2.17	2.56±2.64	0.001*
FIQ	57.92±12.42	45.07±23.57	0.061

Table III: Demographic and clinical features of ankylosing spondylitis according to the coexisting of fibromyalgia syndrome .

FMS: Fibromyalgia syndrome, BASFI: Bath Ankylosing Spondylitis Functional Index, BASDAI: Bath Ankylosing Spondylitis Disease Activity Index, BASMI: Bath Ankylosing Spondylitis Metrology Index, ASQOL: Ankylosing Spondylitis Quality of Life BDI: Beck Depression Index, VAS: Visual Analogue Scale, NTP: Number of tender points, FIQ: Fibromyalgia Impact Questionnaire

**p<0.05 is significant*

Discussion

In the present study, it was found that the frequency of coexisting FMS was 16.9% in patients with AS. In addition, it was shown that there was an increased disease activity and decreased quality of life in AS patients with coexisting FMS compared to those without. Previous studies determined that FMS was also associated with diabetes mellitus, endometriosis, inflammatory bowel disease, hepatitis C and human immunodeficiency virus (HIV). FMS association with rheumatic diseases was first shown for rheumatoid arthritis. The coexisting of FMS with Sjögren syndrome, systemic lupus erythematous, psoriatic arthritis or Behçet's disease has been investigated in several studies[4, 20]. In AS patients, association with FMS was addressed in the limited number of studies[5-7].

In a study on 36 patients with AS (18 women and 18 men) by Aloush et al.[5], it was reported that FMS frequency was 50% in female AS patients, while there was no FMS case in male AS patients. In another study on 54 men and 17 women with AS, association with FMS was shown with a frequency of 11%. In that study, the frequency of FMS was also higher in female than male patients (35.2% vs. 9.2%)[6]. Study by Almodovar et al.[7] has the largest sample size with 462 AS patients. In that study, FMS frequency was 4.11% in all patients and 10.83% in female patients. The FMS frequency among patients with AS varies from 4% and 50% in previous studies. The frequency of 16.9% observed in our study was in the above-mentioned range. In the present study, the frequency of FMS was found as 50% in female patient and 8.19% in male patients in agreement with the literature.

The studies on FMS patients suggested that exercise should be among therapeutic options. Stretching, relaxing, walking, pool-based exercises and aerobic exercises were evaluated. Aerobic exercise for increases in cardio respiratory fitness is particularly recommended[21]. Although the type of exercise recommended is different, the finding that the frequency of FMS was lower in AS patients performing breathing and posture exercises in regular manner is consistent with the literature. However, based on our results, it can be misleading to reach a conclusion that the association of FMS with AS is lower in patients performing regular exercises. It is obvious that there is a need for studies with larger sample size and well-designed studies.

Functional limitation is an inevitable outcome in majority of the chronic rheumatic diseases. These limitations are mainly detected by self-reporting scales which assess the skills of daily living activities in patients[22]. This scale is BASFI in patients with AS[12]. In the previous studies, an increase in BASFI scores, in other words decrease in functional capacity, was detected in the presence of coexisting FMS[5, 6]. In our study, no such a relationship was detected. Limitation in spinal mobility was detected by using BASMI based on physical examination[12]. No marked limitation was detected in spinal mobility in our patients and the presence of FMS didn't affect spinal mobility. The relationship between spinal mobility and the presence of FMS hasn't been evaluated in previous studies. This observation adds value to the present study. The lack of effect of FMS on functional capacity and spinal mobility may result from the fact that the patients already had lower BASFI and BASMI scores. The presence of coexisting FMS might be failed to affect these scales which were already indicating lower scores as great as to cause a significant difference.

The disease activity is the most important parameter that guides planning and modification of the treatment in AS[23]. In patients with AS, the BASDAI is the most commonly used parameter in the assessment of disease activity[12]. In our study, the higher BASDAI scores were recorded in AS patients with coexisting FMS. This finding is in favour of previous data. It has been shown that BASDAI scores were affected from the presence of FMS in patients with AS where higher scores were recorded in such patients[5-7]. Notably, the presence of coexisting FMS should be kept in mind and the required assessment regarding FMS should be undertaken when determining disease activity by BASDAI scores and planning treatment. Treating coexisting FMS may decrease the disease activity and prevent errors in treatment plans. In this regard, our study is also cautionary regarding influence of FMS on BASDAI scores in agreement with previous studies.

Many studies emphasized the poorer quality of life in patients with AS. It has been suggested that gender, educational status, pain intensity, disease activity, functional capacity, spinal mobility and coexisting conditions affect quality of life. Moreover, decrease in quality of life becomes more apparent by advancing age in diseases such as rheumatoid arthritis, but quality of life is affected at earlier ages in patients with AS. Thus, it is essential to identify the factors influencing on quality of life and to take measures needed in patients with AS[24,25]. Conflicting results were obtained when effects of coexisting FMS on quality of life in patients with AS are evaluated. Aloush et al. suggested that presence of coexisting FMS didn't affect the quality of life in patients with AS[5], while Azevedo et al. reported that it caused deterioration in quality of life[6]. Our results seem to support those obtained in the study by Azevedo et al.

FIQ is a widely used scale in patients with FMS, which assesses severity of disease and failure to maintain daily living activities due to disease as well as effectiveness of different treatment modalities (16). No significant difference was detected in FIQ scores between AS patients with and without coexisting FMS in our study as similar to the study by Aloush et al[5]. On the other hand, it could be suggested that higher mean FIQ scores (57.92±12.42) or moderate involvement were recorded in patients with coexisting FMS while those without FMS has lower score (45.07±23.57) or mild involvement.

In our study, level of depression was evaluated which hasn't been addressed in other studies. Mean BDI scores were found to be higher in patients with coexisting FMS compared to those without, but the difference wasn't significant (19.07±11.75 vs. 17.42±13.98, respectively). Both groups had moderate depression and presence of coexisting FMS didn't alter level of depression. This could be explained by the fact that both conditions are often accompanied by depression. The results of one study suggest that FMS is not a homogeneous disease but shows varying proportions of comorbid anxiety and depression dependent on psychosocial characteristics of the patients[26]. It was also shown that psychological disorders often accompany to AS, as depression and anxiety being most common disorders in patients with AS[27-29].

In conclusion, one should consider that coexisting FMS may be present in patients with AS and that the presence of FMS may have negative effects on disease activity. The presence of FMS should be taken into consideration while planning treatment according to disease activity measured by BASDAI scores. In addition, the presence of coexisting FMS causes decreased quality of life in patient with AS. The detection and appropriate treatment of FMS can contribute to improvement in quality of life in this patient group who already has poor quality of life.

References

1) Braun J, Sieper J. *Ankylosing spondylitis*. Lancet 2007; 369: *1379-1390*.
2) Choy E, Marshall D, Gabriel ZL, Mitchell SA, Gylee E, Dakin HA. *A systematic review and mixed treatment comparison of the efficacy of pharmacological treatments for fibromyalgia*. Semin Arthritis Rheum 2011; 41: *335-345*.
3) Grodman I, Buskila D, Arnson Y, Altaman A, Amital D, Amital H. *Understanding fibromyalgia and its resultant disability*. Isr Med Assoc J 2011; 13: *769-772*.
4) Yunus MB. *The prevalence of fibromyalgia in other chronic pain conditions*. Pain Res Treat 2012; 2012: *584-573*.
5) Aloush V, Ablin JN, Reitblat T, Caspi D, Elkayam O. *Fibromyalgia in women with ankylosing spondylitis*. Rheumatol Int 2007; 27: *865-868*.
6) Azevedo VF, Paiva Edos S, Felippe LR, Moreira RA. *Occurrence of fibromyalgia in patients with ankylosing spondylitis*. Rev Bras Reumatol 2010; 50: *646-650*.
7) Almodóvar R, Carmona L, Zarco P, Collantes E, González C, Mulero J, et al. *Fibromyalgia in patients with ankylosing spondylitis: prevalence and utility of the measures of activity, function and radiological damage*. Clin Exp Rheumatol 2010; 28: *S33-39*.
8) Van der Linden S, Valkenburg HA, Cats A. *Evaluation of diagnostic criteria for ankylosing spondylitis. A proposal for modification of New York Criteria*. Arthritis Rheum 1984; 27: *361-381*.
9) No authors listed. *Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults: executive summary. Expert Panel on the Identification, Evaluation, and Treatment of Overweight in Adults*. Am J Clin Nutr 1998; 68: *899-917*.
10) Yanik B, Gursel YK, Kutlay S, Ay S, Elhan AH. *Adaptation of the Bath Ankylosing Spondylitis Functional Index to the Turkish population, its reliability and validity: functional assessment in AS*. Clin Rheumatol 2005; 24: *41-47*.
11) Akkoc Y, Karatepe AG, Akar S, Kirazli Y, Akkoc N. A *Turkish version of the Bath Ankylosing Spondylitis Disease Activity Index: reliability and validity*. Rheumatol Int 2005; 25: *280-284*.
12) Zochling J. *Measures of symptoms and disease status in ankylosing spondylitis: Ankylosing Spondylitis Disease Activity Score (ASDAS), Ankylosing Spondylitis Quality of Life Scale (ASQoL), Bath Ankylosing Spondylitis Disease Activity Index (BASDAI), Bath Ankylosing Spondylitis Functional Index (BASFI), Bath Ankylosing Spondylitis Global Score (BAS-G), Bath Ankylosing Spondylitis Metrology Index (BASMI), Dougados Functional Index (DFI), and Health Assessment Questionnaire for the Spondylarthropathies (HAQ-S)*. Arthritis Care Res (Hoboken) 2011; *S47-58*.
13) Price DD, McGrath PA, Rafii A, Buckingham B. *The validation of visual analogue scales as ratio scale measures for chronic and experimental pain*. Pain 1983; 17: *45-56*.
14) Beck AT, Steer RA, Garbin MG. *Psychometric properties of the Beck depression inventory: twenty-five years of evaluation*. Clin Psychol Rev 1988; 8: *77-100*.
15) Hisli N. *Validity and accuracy of Beck depression inventory among university students*. Turkish J Psychology 1989; 7: *3-13*. [in Turkish].
16) Wolfe F, Smythe HA, Yunus MB, Bennet RM, Bombardier C, Goldenberg DL, et al. *The American College of Rheumatology 1990 Criteria for the classification of fibromyalgia. Report of the Multicenter Criteria Committee*. Arthritis Rheum 1990; 33: *160-72*.
17) Burckhardt CS, Clark SR, Bennett RM. *The fibromyalgia impact questionnaire: development and validation*. J Rheumatol 1991; 18: *728-733*.
18) Sarmer S, Ergin S, Yavuzer G. *The validity and reliability of the Turkish version of the Fibromyalgia Impact Questionnaire*. Rheumatol Int 2000; 20: *9-12*.
19) Bennett R. *The fibromyalgia impact questionnaire (FIQ): a review of its development, current version, operating characteristics and uses*. Clin Exp Rheumatol 2005; 23: *154-162*.
20) Lee SS, Yoon HJ, Chang HK, Park KS. *Fibromyalgia in Behçet's disease is associated with anxiety and depression, and not with disease activity*. Clin Exp Rheumatol 2005; 23: *S15-9*.
21) Hagen KB, Dagfinrud H, Moe RH, Østerås N, Kjeken I, Grotle M, et al. *Exercise therapy for bone and muscle health: an overview of systematic reviews*. BMC Med 2012; 10: *167*.
22) Feinstein AR, Josephy BR, Wells CK. *Scientific and clinical problems in indexes of functional disability*. Ann Intern Med 1986; 105: *413-20*.
23) Braun J, Davis J, Dougados M, Sieper J, van der Linden S, van der Heijde D. *First update of the international ASAS consensus statement for the use of anti-TNF agents in patients with ankylosing spondylitis*. Ann Rheum Dis 2006; 65: *316-320*.
24) Bostan EE, Borman P, Bodur H, Barça N. *Functional disability and quality of life in patientswith ankylosing spondylitis*. Rheumatol Int 2003; 23: *121-126*.
25) Yılmaz O, Tutoğlu A, Garip Y, Ozcan E, Bodur H. *Health-related quality of life in Turkish patients with Ankylosing spondylitis: impact of peripheral involvement on quality of life in terms of disease activity, functional status, severity of*

pain, and social and emotional functioning. Rheumatol Int 2013; 33: *1159-1163*.
26) Thieme K, Turk DC, Flor H. *Comorbid depression and anxiety in fibromyalgia syndrome: relationship to somatic and psychosocial variables*. Psychosom Med 2004; 66: *837-844*.
27) Barlow JH, Macey SJ, Struthers GR. Gender, *depression and ankylosing spondylitis*. Arthritis Care Res 1993; 6: *45-51*.
28) Eren I, Sahin M, Cure E, Inanlı IC¸ Tunc SE, Kucuk A. *Interaction between psychiatric symptoms and disability and quality of life in ankylosing spondylitis patients*. Arch Neuropsychiatr 2007; 44: *1-9*.
29) Martindale J, Smith J, Sutton CJ, Grennan D, Goodacre L, Goodacre JA. *Disease and psychological status in ankylosing spondylitis*. Rheumatology 2006; 45: *1288-1293*.

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