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Comparison of Prevalence of Fibromyalgia in Axial Spondyloarthritis Patients According to ACR 1990 FM, ACR 2010 FM, AAPT 2018 FM Criteria and the Effect of Concomitant Fibromyalgia on Disease Activity, Quality of Life, Functionality and Enthesopathy

Aksiyel Spondiloartropatide Fibromiyalji Prevalansının ACR 1990 FM, ACR 2010 FM, AAPT 2018 FM Kriterlerine Göre Karşılaştırılması ve Eşlik Eden Fibromiyaljinin Hastalık Aktivitesi, Yaşam Kalitesi, Fonsiyonalite ve Entezopatiye Etkisi

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Abstract

Objectives: The aim of the study is to identify and compare prevalence of fibromyalgia (FM) in axial spondyloarthritis (axSpA) patients according to American College of Rheumatology (ACR) 1990 FM, ACR 2010 FM classification and diagnosis and (ACTTION - American Pain Society Pain Taxonomy) AAPT 2018 FM diagnosis criteria. The second aim of study is to investigate the effect of FM on axSpA disease activity, quality of life, functionality and enthesopathy.

Materials and Methods: The present study was single-center cross-sectional analysis conducted on 86 axSpA (61 nr-axSpA, 25 AS) patients according to the (Assessment in Spondyloarthritis International Society) ASAS criteria. Demographic characteristics, disease duration, HLA B27 positivity, erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), Bath AS Disease Activity Index (BASDAI), Bath AS Functional Index (BASFI), Bath Ankylosing Spondylitis Metrology Index (BASMI), Maastricht AS (Maastricht Ankylosing Spondylitis Enthesitis Score), AS Disease Activity Score-CRP (ASDAS-CRP), AS Disease Activity Score Sedimentation (ASDAS-ESR), Ankylosing Spondylitis Quality of Life (ASQoL) and Fibromyalgia Impact Questionnaire (FIQ) are measured. 1990 ACR and 2010 ACR FM classification, diagnosis criteria and AAPT 2018 FM diagnosis criteria were applied to all patients.

Results: Seven (8.1%), 36 (41.9%), 33 (38.4%) of the patients were FM according to the 1990 ACR FM, 2010 ACR FM criteria and 2018 AAPT 2018 FM criteria, respectively. 1990 ACR FM criteria was correlated with BASFI (r=0.375, p=0.001), BASDAI (r=0.250, p=0.020), MASES (r=0.228, p=0.035), ASQoI (r=0.264, p=0.014) and FIQ (r=0.321, p=0.003). 2010 ACR FM criteria was correlated with BASFI, BASMI, BASDAI, ASDAS-ESR, ASDAS-CRP, MASES, ASQoL and FIQ (r between: 0.267 and 0.666, p between: 0.001-0.013). AAPT 2018 FM criteria was correlated with BASDAI (r=0.282, p=0.008) and FIQ (r=0.263, p=0.014).

Conclusions: The presence of FM negatively affects the quality of life, disease activity and functionality in axSpA patients. AAPT 2018 FM criteria practically may be used to define FM in daily practice. Concomitant FM in axSpA patients might be taken into consideration for the management of treatment.

Key Words: Fibromyalgia, axial spondyloarthropathy, ankylosing spondylitis, quality of life, disease activity

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Öz

Amaç: Bu çalışmanın amacı, 1990 American College of Rheumatology (ACR) FM, 2010 ACR FM ve AAPT 2018 FM kriterlerine göre FM prevalansını hesaplamak ve karşılaştırmaktır. İkinci amacı ise axSpA'ya eşlik eden fibromiyaljinin hastalık aktivitesine, yaşam kalitesine, fonksiyonalite ve entezopatiye etkisini ortaya çıkarmaktır.

Gereç ve Yöntem: Bu çalışma tek merkezli kesitsel çalışmadır. ASAS kriterlerine göre axSpA tanısı almış 86 (61 nr-axSpA, 25 AS) hasta ile gerçekleştirilmiştir. Demografik karakterleri, hastalık süresi, HLA B27 pozitifliği, eritrosit sedimentasyon hızı, C-reaktif protein (CRP), BASDAI, BASFI, BASMI, MASES, ASDAS-CRP, ASDAS-ESR, ASQoL ve FIQ ölçülmüştür. Hastalara 1990 ACR FM, 2010 ACR FM ve AAPT 2018 FM kriterlerine FM prevalansı hesaplanmıştır.

Bulgular: Hastaların 1990 ACR ,2010 ACR FM ve AAPT 2018 FM kriterlerine göre FM prevalansı sırasıyla 7 (%8,1), 36 (%41,9), 33 (%38,4) olarak bulunmuştur. 1990 ACR FM kriteri BASFI (r=0,375, p=0,001), BASDAI (r=0,250, p=0,020), MASES (r=0,228, p=0,035), ASQol (r=0,264, p=0,014) ve FIQ (r=0,321, p=0,003) ile koraledir. 2010 ACR FM kriteri BASFI, BASMI, BASDAI, ASDAS-ESR, ASDAS-CRP, MASES, ASQoL ve FIQ ile koraledir. (r=0,267-0,666, p=0,001-0,013). AAPT 2018 FM kriteri ise BASDAI (r=0,282, p=0,008) ve FIQ (r=0,263, p=0,014) ile koraledir.

Sonuç: axSpA hastalarda, FM varlığı yaşam kalitesini, hastalık aktivitesini ve fonksiyonaliteyi olumsuz olarak etkiler. AAPT 2018 FM kriterleri, günlük pratikte FM tanısını koymak için kullanılabilir. axSpA'ya eşlik eden fibromiyalji, hastalığın tedavisinin yönetilmesinde dikkate alınmalıdır.

Anahtar Kelimeler: Fibromiyalji, aksiyel spondiloartropati, ankilozan spondilit, yaşam kalitesi, hastalık aktivitesi

Introduction

Spondyloarthropathy defines a group of interrelated disease, which have common clinical, radiographic and genetic features. They are associated with HLA B27 positive (1). Spondyloarthropathies are categorized as axial (axSpA) and peripheral (pSpA) depending on dominant location of involvement, according to ASAS classification criteria. ASAS criteria allow early diagnose of axSpA by non-radiographic MRI examination besides conventional radiography (2).

pSpA varies between 0.2% and 1.6% depending on geographical and racial factors and classification criteria (3). High disease activity, functional disability and structural damage results in impaired quality of life in axSpA patients (4).

Fibromyalgia (FM) is a chronic pain syndrome characterized by widespread pain, unrefreshing sleep, fatigue, morning stiffness and cognitive dysfunction. The etiology of FM is still unclear; but central sensitization is considered the most important mechanism (5). Prevalence of FM varies between 0.2% and 0.6% depending on geographical region, gender and age (6). FM occurs within 3.6% of women population in Turkey (7). FM is an important disability reason and causes impaired quality of life (8). FM is more frequent in rheumatic diseases, could be related to the disease activity and poor quality of life (9,10). In addition, FM and axSpA share similar symptoms such as pain, fatigue, and morning stiffness, which causes difficulties in diagnosis.

The relationship between axSpA and FM is well known issue. Studies representing prevalence of FM in axSpA was showed that estimated prevalence is range from 4.1% to 44.4% in the literature review (11-17). Over a long period, several diagnostic and classification criteria have been developed. However, researchers need more useful and practical criteria to diagnose for FM.

The Analgesic, Anesthetic, and Addiction Clinical Trial Translations Innovations Opportunities and Networks (ACTTION) and American Pain Society (APS) started the ACTTION- APS Pain Taxonomy (AAPT) to create new alternative diagnostic criteria for chronic pain disorders. AAPT FM Working Group focused to make practical diagnostic criteria and to catch the cardinal symptoms such as widespread pain, sleep, and fatigue (18).

The aim of the study was to identify and compare prevalence of FM in axSpA patients according to ACR 1990 FM, ACR 2010 FM classification and diagnosis criteria and AAPT 2018 FM diagnosis criteria (19,20). The second aim of the study was to investigate the effects of FM on axSpA disease activity, quality of life and functionality. To the best of our knowledge, this is the first study to use APTT 2018 criteria to diagnose FM in the axSpA population.

Materials and Methods

The present study was a single-center cross-sectional analysis conducted on 86 axSpA patients who were referred the Rheumatologic Diseases Outpatient Clinic of the Physical Medicine and Rehabilitation Department between August 2018 and September 2020. The inclusion criteria were a diagnosis of axSpA according to the ASAS criteria and age ≥18 years. Individuals who had another inflammatory rheumatic disease, progressive or non-progressive neurological disease, history of trauma, back surgery or malignancy, psychiatric and mood illness such as anxiety and depression were excluded in this study.

Prior to the evaluation, all participants provided written informed consent. The study adhered to the guidelines of the Declaration of Helsinki. The study protocol was approved by the University of Health Sciences Türkiye, Dışkapı Yıldırım Beyazıt Training and Research Hospital Ethics Committee (decision no: 100/04, date: 14.12.2020).

Demographic Characteristics

Demographic characteristics of the patients including age, gender, education duration, body mass index and presence of additional comorbidity as well as disease duration (years), HLA B27 positivity were recorded.

Clinical Disease Characteristics

Disease duration, HLA B27 positivity, erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) of patients were recorded. In addition, Bath Ankylosing Spondylitis Disease Activity Index (BASDAI) for disease activity and Bath Ankylosing Spondylitis Functional Index (BASFI) for functional limitation as well as Bath Ankylosing Spondylitis Metrology Index (BASMI) were performed to define clinically significant changes in spinal mobility (21,22). The scores of scales were evaluated between 0-10. Low scores on all three scales indicated good condition.

The disease activity was also evaluated with The Ankylosing Spondylitis Disease Activity Score (ASDAS) ESR and ASDAS-CRP (23). They include clinic parameters such as back pain, morning stiffness, patient global assessment and peripheral pain/swelling and laboratory data including ESR and CRP.

Maastricht Ankylosing Spondylitis Enthesitis Score (MASES) were used for enthesitis status. It is scored between 0 and 13 points. The quality of life was measured with Ankylosing Spondylitis Quality of Life (ASQol) (24). It was assessed AS patient's life expectancies and the impact of disease on these expectancies with 18-item (range 0-18). 1990 and 2010 ACR, and AAPT 2018 FM diagnosis criteria as well as Fibromyalgia Impact Questionnaire (FIQ) were performed to all patients. 1990 ACR criteria for the classification of FM are 1) widespread pain in combination with 2) tenderness at 11 or more of the 18 specific tender point sites. No exclusions are made for the presence of concomitant radiographic or laboratory abnormalities.

2010 ACR diagnostic criteria for FM if the following 3 conditions are met: 1) Widespread pain index (WPI) 7 and symptom severity (SS) scale score 5 or WPI 3-6 and SS scale score 9. 2) Symptoms have been present at a similar level for at least 3 months and 3) The patient does not have a disorder that would otherwise explain the pain. AAPT 2018 FM include 3 items: 1) Multi side pain (MSP) defined as 6 or more pain sites from a total of 9 possible sites, 2) Moderate to severe sleep problems or fatigue and 3) MSP plus fatigue or sleep problems must have been present for at least 3 months. FIQ is a 10-item questionnaire to assess the health status of patients with FM. Total score ranges from 0-100. Higher score indicates a great impact of FM on the individuals. The validity of reliability of the Turkish version of the scale have been established (25).

Study Protocol

In all individuals, the presence of FM was determined according to the 1990 ACR, 2010 ACR and 2018 APTT FM Diagnostic criteria. Patients with and without FM were compared in terms of AS and FM scales results according to the three criteria. In addition, the AS and FM scale scores were correlated with the presence of FM in all three groups. Regression analysis was performed for significant correlations.

Statistical Analysis

Data analyses were made using the Statistical Package for the Social Sciences 22.0 for Windows. The continuous variables were evaluated with the Kolmogorov-Smirnov test as to whether they were different from a normal distribution. Descriptive statistics were shown as median (minimum-maximum) for continuous variables and frequencies and percentages (%) for nominal variables. The Mann-Whitney U test was performed to compare parameters of patient with and without FM. Spearman rho correlation analysis was used. Univariate regression analysis was applied for BASDAI and FIQ, which is common for all criteria. A p-value <0.05 was considered as statistically significant.

Results

The median age of the patients included in the study was 49.00 (30.0-72.0) years, 45 (52.3%) were male and 41 (47.7%) were female. The median disease duration was 6.0 (1.0-42.0) years. Demographic and disease characteristics are presented in Table 1 and 2.

Table 1: Demographic characteristics of patients

	n=86 **median (min-max), n (%)**
Age (years)	49.0 (30.0-72.0)
Gender Male Female	 45 (52.3) 41 (47.7)
Education duration Illetirate 5 years 8 years 11 years ≥11 years	 6 (7.0) 22 (25.6) 23 (26.7) 21 (24.4) 14 (16.3)
BMI (%)	27.0 (20.4-37.8)
Additional comorbidities Hypertension Diabetes mellitus Hyperlipidemia	64 (74.4) 42 (48.8) 8 (9.2) 31 (36.0)

BMI: Body mass index, Min-max: Minimum-maximum

While the disease activity of patients (BASDAI), functional (BASFI) and metrology index (BASMI) were mild level (3.4 (0.0-8.4), 2.5 (0.0-8.2) and 3.2 (1.4-7.2), respectively. Disease activity according to the ASDAS-ESR and ASDAS-CRP was high disease activity levels 2.4 (1.1-4.3) and 2.5 (1.1-5.3), respectively.

Seven (8.1%), 36 (41.9%) and 33 (38.4%) of the patients were FM according to the 1990, 2010 and 2018 criteria, respectively. The median FIQ score was 42.0 (3.6-84.7).

Table 2: Disease-related clinical and laboratory parameters of patients

	n=86 median (min-max), n (%)
Disease duration (years)	6.0 (1.0-42.0)
BASFI (0-10)	2.5 (0.0-8.2)
BASMI (0-10)	3.2 (1.4-7.2)
BASDAI (0-10)	3.4 (0.0-8.4)
ASDAS-ESR	2.4 (1.1-4.3)
ASDAS-CRP	2.5 (1.1-5.3)
MASES (0-13)	3.0 (0.0-10.0)
ASQoL (0-18)	7.0 (0.0-18.0)
ESR (mm/hr)	10.0 (2.0-32.0)
CRP (mg/L)	4.00 (3.0-55.0)
HLA B27 positivity	44 (51.2)
Medication NSAII Salazopyrin Anti-TNF	 84 (97.7) 16 (18.6) 11 (12.8)

ESR: Erythrocyte Sedimentation Rate, CRP: C-reactive protein, BASFI: Bath Ankylosing Spondylitis Functional Index, BASMI: Bath Ankylosing Spondylitis Metrology Index, BASDAI: Bath Ankylosing Spondylitis Disease Activity Index, ASDAS-ESR: Ankylosing Spondylitis Disease Activity Score – ESR, ASDAS-CRP: Ankylosing Spondylitis Disease Activity Score -CRP, MASES: Maastrich, Ankylosing Spondylitis Enthesitis Score, ASQoL: Ankylosing Spondylitis Quality of Life, FIQ: Fibromyalgia Impact Questionnaire, HLA: Human leukocyte antigen

Comparison of three groups according to the FM criteria are shown in Table 3. There are significant increase BASFI (p=0.003), BASDAI (p=0.026), ASQol (p=0.025) and FIQ (p=0.008) scores according to the 1990 criteria, all parameters except disease duration according to the 2010 criteria and BASDAI (p=0.032) and FIQ (p=0.029) scores according to the 2018 criteria.

Correlation between FM criteria and clinical disease parameters are presented in Table 4.

1990 criteria were correlated with BASFI (r=0.375, p=0.001), BASDAI (r=0.250, p=0.020), MASES (r=0.228, p=0.035), ASQol (r=0.264, p=0.014) and FIQ (r=0.321, p=0.003), 2010 criteria with all parameters (r between: 0.267 and 0.666, p between: 0.001-0.013), and 2018 criteria with BASDAI (r=0.282, p=0.008) and FIQ (r=0.263, p=0.014).

Univariate regression analysis was performed for the BASDAI and FIQ parameters correlated for all criteria (Table 5). For all three criteria, the presence of FM was an effective factor on BASDAI score.

Discussion

In the present study, prevalence of FM has been determined according to ACR 1990 classification, ACR 2010 diagnosis and classification and APTT 2018 diagnosis criteria and found 8.1%, 41.9% and 38.4% in the axSpA patients, respectively. It has been observed that concomitant FM in axSpA affects disease activity, quality of life, functionality and enthesopathy scores (26).

FM prevalence in axSpA varies considerably range from 4.1% to 44.4% in the literature (11,14). The discrepancy of FM prevalence in rheumatic disease may be related with using different classification criteria, ethnical variation and study population. Zhao et al. (9) has found 14% FM prevalence in inflammatory arthritis in their meta-analysis study when Jones

Table 3: Comparison of 3 Groups according to the FM criteria

	1990 FM criteria, median (min-max)			**2010 FM criteria, median (min-max)**			**2018 FM criteria, median (min-max)**		
	F+ n=7	**F- n=79**	**p**	**F+ n=36**	**F- n=50**	**p**	**F+ n=33**	**F- n=53**	**p**
Disease duration (years)	6.0 (1.0-7.0)	6.0 (1.0-42.0)	0.932	6.0 (1.0-42.0)	7.5 (1.0-35.0)	0.072	6.0 (2.0-42.0)	6.0 (1.0-35.0)	0.608
BASFI (0-10)	6.1 (3.2-8.2)	2.1 (0.0-7.1)	**0.003**	3.8 (1.1-8.2)	1.3 (0.0-7.1)	**0.001**	3.1 (0.0-7.4)	2.5 (0.0-8.2)	0.463
BASMI (0-10)	3.4 (2.8-5.0)	3.0 (1.4-7.6)	0.405	3.7 (1.6-6.2)	2.6 (1.4-7.6)	**0.004**	3.4 (2.2-6.2)	3.0 (1.4-7.6)	0.244
BASDAI (0-10)	5.4 (2.4-8.2)	3.0 (0.0-8.4)	**0.026**	5.0 (2.4-8.4)	2.1 (0.0-6.0)	**0.001**	4.6 (0.0-7.0)	3.0 (0.1-8.4)	**0.032**
ASDAS-ESR	2.6 (1.7-3.5)	2.4 (1.1-4.3)	0.159	2.8 (1.6-4.3)	1.7 (1.1-3.5)	**0.001**	2.6 (1.3-4.3)	2.2(1.1-4.1)	0.121
ASDAS-CRP	2.7 (1.5-3.7)	2.5 (1.1-5.3)	0.963	2.8 (1.5-5.3)	2.3 (1.1-3.9)	**0.001**	2.7 (1.1-5.3)	2.5 (1.1-4.4)	0.569
MASES (0-13)	5.0 (3.0-10.0)	3.0 (0.0-9.0)	0.058	5.0 (2.0-10.0)	2.0 (0.0-9.0)	**0.001**	3.0 (0.0-10.0)	3.0 (0.0-9.0)	0.499
ASQoL (0-18)	13.0 (6.0-18.0)	7.0 (0.0-17.0)	**0.025**	10.5 (5.0-18.0)	4.0 (0.0-17.0)	**0.001**	8.0 (0.0-18.0)	7.0 (0.0-17.0)	0.381
FIQ (0-100)	84.12 (49.0-84.7)	41.19 (3.6-76.6)	**0.008**	58.65(31.5-84.7)	37.2(3.6-73.8)	**0.001**	56.8 (3.6-84.7)	40.1 (6.6-78.3)	**0.029**

BASFI: Bath Ankylosing Spondylitis Functional Index, BASMI: Bath Ankylosing Spondylitis Metrology Index, BASDAI: Bath Ankylosing Spondylitis Disease Activity Index, ASDAS-ESR: Ankylosing Spondylitis Disease Activity Score - ESR, ASDAS-CRP: Ankylosing Spondylitis Disease Activity Score -CRP, MASES: Maastrich Ankylosing Spondylitis Enthesitis Score, ASQoL: Ankylosing Spondylitis Quality of Life, FIQ: Fibromyalgia Impact Questionnaire

Table 4: Correlation between FM criteria and clinical disease parameters			
	1990 FM criteria r/p	**2010 FM criteria r/p**	**2018 FM criteria r/p**
Disease duration (years)	0.126/0.246	**0.267/0.013**	0.082/0.452
BASFI (0-10)	**0.375/0.001**	**0.582/0.001**	0.090/0.411
BASMI (0-10)	0.112/0.307	**0.394/0.001**	0.182/0.094
BASDAI (0-10)	**0.250/0.020**	**0.666/0.001**	**0.282/0.008**
ASDAS-ESR	0.167/0.133	**0.532/0.001**	0.176/0.113
ASDAS-CRP	0.021/0.850	**0.483/0.001**	0.041/0.714
MASES (0-13)	**0.228/0.035**	**0.442/0.001**	0.069/0.525
ASQoL (0-18)	**0.264/0.014**	**0.565/0.001**	0.088/0.418
FIQ (0-100)	**0.321/0.003**	**0.593/0.001**	**0.263/0.014**

r: correlation coefficient, BASFI: Bath Ankylosing Spondylitis Functional Index, BASMI: Bath Ankylosing Spondylitis Metrology Index, BASDAI: Bath Ankylosing Spondylitis Disease Activity Index, ASDAS-ESR: Ankylosing Spondylitis Disease Activity Score – ESR, ASDAS-CRP: Ankylosing Spondylitis Disease Activity Score -CRP, MASES: Maastrich Ankylosing Spondylitis Enthesitis Score, ASQoL: Ankylosing Spondylitis Quality of Life, FIQ: Fibromyalgia Impact Questionnaire, ESR: Erythrocyte Sedimentation Rate, CRP: C-reactive protein

Table 5: Univariate regression analysis for BASDAI and FIQ				
	B	**SE**	**95%CI (lower-upper) for B**	**p**
1990 criteria				
BASDAI	1.51	0.348	0.824-2.208	**0.011**
FIQ	0.066	0.035	0.003-0.136	**0.027**
2010 criteria				
BASDAI	1.34	0.348	0.647-2.032	**0.001**
FIQ	0.136	0.041	0.066-0.205	**0.001**
2018 criteria				
BASDAI	0.590	0.203	0.187-0.993	**0.001**
FIQ	0.016	0.020	0.014-0.057	**0.008**

B: Regression coefficients (B), CI: coefficient interval, SE: Standard error, p= p-values of multivariate linear regression analysis.
BASDAI: Bath Ankylosing Spondylitis Disease Activity Index, FIQ: Fibromyalgia Impact Questionnaire

et al. (11) has used Scotland Registry for AS (SIRAS) in another meta-analysis study and calculated FM prevalence 16.4% in axSpA patients. Baraliakos et al. (13) applied ACR 2010 and ACR 1990 FM criteria in the same patient group and they obtained a higher rate of FM prevalence as 24% in ACR 2010 criteria in comparison to 13.5% in ACR 1990 FM. The studies showed that the FM prevalence using ACR 1990 is smaller compared to ACR 2010. It can be related with lower sensitivity and higher specificity of ACR 1990 FM criteria.

The prevalence of FM also depends on socio-cultural and environmental factors. Sayın et al. (15) demonstrated the prevalence of FM using ACR 2010 as 33.9%, which has similar socio-cultural and environmental factors with the present study population. The results of present study were consistent with this study.

BASDAI is a self-reported questionnaire evaluating the patient's symptoms such as pain, fatigue, tenderness, stiffness, which shares with similar FM symptoms. Moreover, BASDAI doesn't reflect the inflammation level. Therefore, concomitant FM in axSpA affects the disease activity scores that lead to inappropriate biological agent and higher dose anti-inflammatory therapy. In the present study, BASDAI and MASES scores were higher in axSpA patients with FM compared to axSpA patients without FM according 1990 and 2010 ciriteria (Table 3). These results were consistent with the study conducted by Wach et al. (16). In addition, Almodóvar et al. (17) had higher BASDAI and BASFI scores of those who met 1990 ACR FM criteria in 462 patients diagnosed with AS compared to those who were not diagnosed with FM. In another study, BASDAI, ASDAS-ESR and ASDAS-CRP values were found to be higher in AS patients with FM than in AS patients without FM (27).

The presence of FM in axSpA should be consider complicating clinical improvement in treatment. Moreover, clinicians may assess better the effectiveness of treatments and clinically meaningful improvement using ASDAS instead of BASDAI.

The present study was also determined the effect of concomitant FM on quality-of-life parameters in axSpA. FM is an important cause of disability and poor quality of life in young population. Our study confirms that concomitant FM negatively affected quality of life scores. Rencber et al. (12) found higher ASQoL scores in axSpA patients with FM compared to those without FM. In order to improve the quality of life in

axSpA patients, the presence of FM should be kept in mind in this population.

To the best knowledge, the present study is the first study using APTT 2018 criteria to diagnose FM in axSpA population. The study reported that the prevalence of FM is 38.4%. ACR 1990 FM classification and ACR 2010/2011 diagnosis and classification criteria are difficult and time consuming to apply in daily practice. ACR 1990 FM criteria may cause misinterpretation because the sensitive points in FM are similar to the enthesis points in axSpA. AAPT 2018 FM criteria is more practical to diagnose FM. It evaluates three basic symptoms of FM such as widespread pain, sleep disturbance and fatigue. AAPT 2018 FM diagnosis criteria also provides patients to localize the painful area on the scheme. However, Salaffi et al. (26) investigated the concordance of the set of diagnostic criteria (ACR 2011, ACR 2016 and APTT criteria) and demonstrated that ACR 2011 criteria are the most closely in consistent with the clinician's decision, while APTT criteria are the worst. Therefore, the future studies are required to evaluate validity and reliability of APTT criteria.

Study Limitations

The effect of FM on drug use and unnecessary drug switch in axSpA was not evaluated and this was a limitation of this study. It would be valuable to include this issue in future studies.

Conclusion

To conclude, coexistence of FM is frequent in axSpA population. The presence of FM negatively affects the quality of life, disease activity and functionality in axSpA patients. APTT criteria practically may provide to define FM in daily practice. Concomitant FM in axSpA patients might be take into consideration the management of treatment.

Ethics

Ethics Committee Approval: The study protocol was approved by the University of Health Sciences Türkiye, Dışkapı Yıldırım Beyazıt Training and Research Hospital Ethics Committee (decision no: 100/04, date: 14.12.2020).

Informed Consent: Prior to the evaluation, all participants provided written informed consent.

Authorship Contributions

Concept: N.G., B.K., E.U., F.H.Ş., Design: N.G., B.K., E.U., F.H.Ş., Data Collection and Processing: N.G., B.K., E.U., F.H.Ş., Analysis or Interpretation: N.G., B.K., E.U., F.H.Ş., Literature Search: N.G., B.K., E.U., F.H.Ş., Writing: N.G., B.K., E.U., F.H.Ş.

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