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Physical Activity and Perceptions of Exercise in Patients with Spondyloarthritis: A Cross-Sectional Study

Spondiloartrit Hastalarının Fizik Aktivitesi ve Egzersiz Algısı: Kesitsel Bir Çalışma

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ABSTRACT

Objective: Exercise is a cornerstone in the management of spondyloarthritis (SpA). The aim of this research was to compare the levels of physical activity (PA) and perceived advantages and barriers to exercise of SpA patients with population controls.

Methods: In this cross-sectional study 200 patients (118 males, 82 females) and 100 controls (50 males, 50 females) were included. Levels of PA were evaluated using the International Physical Activity Questionnaire-Short Form and perceptions of exercise were assessed using Exercise Benefits and Barriers Scale. Fatigue, psychological status and quality of life of all participants were questioned. Disease activity, functions and mobility of the patients were also assessed. Correlations were analyzed between disease parameters and perceptions of exercise.

Results: PA levels were similar on both groups. Of the patients 65% met recommended amount of exercise. Deterioration of psychological status and quality of life were associated with decreased PA levels of the patients. Patients reported fatigue and lack of time barriers more than controls. When disease activity, functionality, mobility, fatigue, psychological status and quality of life of the patients deteriorated, perceived barriers to exercise increased.

Conclusion: Health professionals should focus on personal barriers to improve exercise behavior in SpA patients.

Keywords: Spondyloarthritis, physical activity, exercise, motivation

ÖZ

Amaç: Egzersiz spondiloartritlerin (SpA) yönetiminde bir köşe taşıdır. Bu araştırmanın amacı, SpA hastalarının fiziksel aktivite (PA) düzeylerini ve egzersizden algılanan avantajları ve engelleri popülasyon kontrolleriyle karşılaştırmaktır.

Yöntemler: Bu kesitsel çalışmaya 200 hasta (118 erkek, 82 kadın) ve 100 kontrol (50 erkek, 50 kadın) dahil edildi. PA seviyeleri Uluslararası Fiziksel Aktivite Anketi-Kısa Form ile değerlendirildi ve egzersiz algıları Egzersiz Faydaları ve Engeller Ölçeği ile değerlendirildi. Tüm katılımcıların yorgunluğu, psikolojik durumu ve yaşam kalitesi sorgulandı. Hastaların hastalık aktivitesi, fonksiyonları ve mobilitesi de değerlendirildi. Hastalık parametreleri ve egzersiz algıları arasındaki korelasyonlar incelendi.

Bulgular: PA seviyeleri her iki grupta da benzerdi. Hastaların %65'i tavsiye edilen egzersiz miktarını karşıladı. Psikolojik durumun ve yaşam kalitesinin bozulması, hastaların PA düzeylerinin azalması ile ilişkiliydi. Hastalar yorgunluk ve zaman yokluğu bariyerini kontrollere göre daha fazla bildirdi. Hastaların hastalık aktivitesi, işlevselliği, hareketliliği, yorgunluğu, psikolojik durumu ve yaşam kalitesi kötüleştiğinde, egzersizin önündeki algılanan engeller arttı.

Sonuç: Sağlık çalışanları, SpA hastalarında egzersiz davranışını iyileştirmek için algılanan kişisel engellere odaklanmalıdır.

Anahtar Kelimeler: Spondiloartritler, fiziksel aktivite, egzersiz, motivasyon

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Introduction

Spondyloarthritis (SpA) is a family of several inflammatory rheumatic diseases. The prototypic and most studied subtype is ankylosing spondylitis (AS). Spinal (axial) features, peripheral arthritis, enthesopathy, and extra-articular features such as uveitis, psoriasis, and inflammatory bowel disease are among the numerous clinical features (1). The SpA is associated with reduced physical function, poorer quality of life, and irreversible structural damage (2). The treatment goals in SpA are to improve the patient's health (e.g., pain, functional disability) and prevent clinical deterioration and progressive structural damage (1). Current guidelines suggest a mixture of pharmacological and non-pharmacological treatment strategies for the effective care of patients with AS and PsA, in which regular exercise is the key to the non-pharmacological treatment (3). The Cochrane systematic review of AS physiotherapy treatments indicates that home exercise or recreational programs of at least 30 minutes a day, 5 to 7 days a week, are successful in improving discomfort, stiffness and preserving functionality (4).

Physical inactivity has been listed as the fourth leading global mortality risk factor (6% of deaths globally). In addition, a variety of comorbidity conditions such as diabetes mellitus, obesity, hypertension, cancer, and osteoporosis are avoided by regular physical activity (PA), which also decreases the risk of cardiovascular comorbidity. Therefore, the World Health Organization (WHO) recommends at least 150 minutes of moderate-intensity aerobic PA or 75 minutes of vigorous-intensity aerobic PA per week, accumulated in bouts of 10 minutes or more, in addition to muscle-strengthening activities twice-weekly or more in adults aged between 18 to 64 years (5).

Despite the growing evidence supporting the importance of exercise in the management of AS, a large proportion of patients are less active than recommended (6-8). Personal, social, and environmental factors affect PA participation (9). Personal factors include expected benefits and barriers to exercise. Barriers to PA (e.g., lack of time, too tiring, no facilities, lack of exercise partner) strongly influence exercise behavior (10). The main objective of this research was to define levels of PA and perceived advantages and barriers of exercise in patients with SpA and compare the results with population controls. The secondary aim was to investigate the relationships between exercise perceptions and demographic characteristics, medications, disease activity, function, mobility, psychological status, and quality of life.

Methods

Patients attending outpatient clinics of physical medicine and rehabilitation and rheumatology departments of a university hospital and population controls were recruited for this cross-sectional comparative study. The research was conducted between March and July 2014. Ethical approval was obtained from the Bezmialem Vakıf University's Clinical Research Ethics Committee (approval number: 71306642/050-01-04/81), and all participants signed informed consent. All patients who met the Assessment of Spondyloarthritis International Society (ASAS) criteria for SpA were considered for inclusion. In addition, population controls matching for gender and age were recruited. Eligibility criteria included the age of 18 to 65 and the ability to understand a questionnaire, willing to fill out a questionnaire. Participants were excluded if they had a concurrent cardiac, respiratory or neurological disorder or comorbidity restricting their exercise capacity.

Demographic characteristics including age, gender, body mass index (BMI), education (year of education), employment status (employed or not), marital status, and smoking history were collected.

Disease characteristics: Clinical variables including disease duration, time since diagnosis, and primary pharmacological managements [non-steroidal anti-inflammatory drugs, sulphasalazine, or anti-tumor necrosis factor (TNF) therapy] of the patients were questioned. C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR) were recorded from the laboratory analyses.

Bath AS Disease Activity Questionnaire (BASDAI), AS Disease Activity Score-Erythrocyte Sedimentation Rate (ASDAS-ESR), and ASDAS-CRP were calculated and recorded to determine the disease activity. BASDAI consists of six questions (fatigue, spinal pain, joint pain or swelling, localized tenderness areas, severity, and duration of morning stiffness) with a 10 cm visual analog scale (VAS). Lower scores indicate less active disease (11). ASDAS-ESR and ASDAS-CRP were calculated with the formula chosen by the ASAS group (7,8). ASDAS scores calculated from BASDAI questions 2, 3, and 6, patient global assessment of disease activity, and CRP (mg/L) for ASDAS-CRP or ESR (mm/h) for ASDAS-ESR (8). Higher values indicate higher disease activity. Cut-off values have been defined as follows; <1.3 inactive disease, 1.3-2.1 moderate disease activity, 2.1-3.5 high disease activity, and >3.5 very high disease activity.

Patients' functional status was evaluated with Bath Ankylosing Spondylitis Functional Index (BASFI) consisting of ten questions (eight questions regarding everyday tasks, two questions testing patient's capacity of coping with daily life) over the past week using a 10 cm VAS, from no limitations (0 cm) to very severe functional limitation (10 cm). Higher scores indicate more severe impairment (12). Both indices were validated to the Turkish language (13,14).

Bath AS Metrology Index (BASMI) assessed mobility, comprised of tragus to wall distance, modified Schober test, cervical rotation, lateral spinal flexion, and intermalleolar distance (15). Higher scores indicate more restricted mobility.

Total back pain score and nocturnal back pain score were assessed with VAS. Fatigue was also measured with VAS by the question, "How would you describe the overall level of fatigue you experienced last week?"

Physical activity: PA levels were evaluated with the International PA Questionnaire-Short Form (IPAQ-S). This self-reported questionnaire was validated in Turkish (16). Volunteers were

asked to remember the number of days, hours, and minutes they spent in PA last week. PA duration of 10 minutes or above was included in the analyses. Energy consumption was expressed as metabolic equivalent (MET) multiplied with time in minutes per week (MET*minutes*week). One MET is the energy consumed at rest, while 3.3 MET is the energy consumed during moderately fast walking, which is 3.3 times higher than at rest. Energy expenditure is 4 MET at moderate PA and 8 MET at vigorous PA. Volunteers were categorized as low, moderate, or high P.A. groups according to their MET*min*week scores.

Exercise profile: The participants' exercise types and frequency were questioned with open-ended questions. Duration of exercise was recorded for the most reported exercise types. The authors compiled the following list according to the most reported activities: Walking, stretching exercises, weight training (including bodybuilding), swimming, football, and other aerobic exercises (e.g., fitness, pilates). Participants were categorized as "met recommended amounts of exercise" if they performed at least 150 minutes of moderate-intensity aerobic-PA or 75 minutes of vigorous-intensity aerobic-PA per week (according to WHO recommendations) (5).

Perceptions of exercise: Exercise perceptions were assessed with the Exercise Benefits and Barriers Scale (EBBS), a well-validated questionnaire initially developed in healthy individuals (17). It is also validated in the elderly population (18), and despite not being validated in chronic diseases, it has been used in many rheumatologic diseases, including AS (6,19). The scale includes 29 benefit items in 5 categories (physical performance, preventive health, psychological outlook, social interaction, and life enhancement) and 14 barrier items in 3 categories (physical exertion, time expenditure, and exercise environment). Respondents rate their agreement with each item on a Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree). Possible total scores range from 43 to 172; barrier items are reverse coded, so higher scores suggest a more favorable view of exercise. Distinct subscores for perceived benefits and perceived barriers range from 29 to 116 and 14 to 56, respectively; higher scores suggest more excellent knowledge of either the benefits or barriers. Benefits and barriers subscales were used in this study.

Psychological status: Beck depression scale, a multiple-choice self-report inventory of 21 questions, one of the most frequently used psychometric measures to assess the severity of depression, was used to assess psychological status. The total score is between 0 and 63, and higher scores indicate more severe depression.

Quality of life: Twelve items Short Form health survey (SF-12) was used to assess the quality of life of the patients and control subjects. Twelve questions selected from SF-36 were combined for a simplified questionnaire. The survey consists of two scales of mental and physical functioning and health-related quality of life (MCS, PCS) (20).

Statistical Analysis

In sample size calculation we aimed to compare three groups according to the level of PA. The study population was determined as 159 using G-power program by taking effect size 0.25, alpha=0.05, power (1-beta)=0.89 at a confidence level of 95%. Adding to sample size 25% to compensate for non-response, the number of study group was determined as 200. One hundred participants were included as control group.

The Statistical Package for Social Sciences version 21.0 was used. Variables were presented as frequency and percentage for categorical variables and continuous data were reported as mean and standard deviation. Group differences were examined by chi-square for categorical variables and independent sample t-test for continuous, normally distributed variables. Normal distribution was investigated with Kolmogorov-Smirnov test. Mann-Whitney U test was used for group comparisons since the variables did not show normal distribution. Possible correlations between demographic characteristics and disease parameters with PA, perceived benefits and barriers of exercise were analyzed with Spearman test. A p-value of <0.05 was considered significant.

Results

Of the 268 patients with SpA eligible for the study, 200 (74.6 %) patients agreed to participate. A hundred gender, age and BMI matched controls were included in the study. The mean age of the patients was 38.76±9.60 and control group was 36.51±10.40 (p=0.065). The mean disease duration of the patients was 11.8±8.5 years. Forty-one patients (%20.5) were on anti-TNF therapy. Table 1 presents detailed descriptions of the participants' demographic profiles and disease parameters.

Physical activity (IPAQ): Twenty-nine patients (14.5%) and 14 (14%) of the control subjects were in high PA category. The PA levels of the patients and controls were similar. The PA levels were negatively correlated with BMI and depression, and positively correlated with physical quality of life. PA was not associated to disease activity (BASDAI, ASDAS CRP, ASDAS ESH), functionality, flexibility or anti TNF treatment.

Exercise profiles: One hundred and thirty patients (65%) and 61 (61%) of the controls met the recommended amount of exercise (at least 150 minutes of aerobic PA with moderate intensity or 75 minutes of aerobic PA with vigorous intensity per week) (p=0.495). Walking was most frequently reported type of exercise and walking amounts were similar on both groups. Stretching and other indoor aerobic exercises (fitness and pilates included) were other frequently reported exercises. Among the patients who met the recommended amount of exercise, 65.5% reported walking and 17% reported doing stretching exercises. Among the controls who met the recommended amount of exercise, 70% reported walking and 11% reported doing indoor aerobic exercises regularly (Table 2).

Fatigue scores of the patient and control groups were not different (p=0.907). Patients were significantly more depressed than controls (p=0.001). Patients' physical and mental quality of life scores assessed by SF12 were significantly worse than controls (PCS; p=0.001, MCS; p=0.007). In analysis of the volunteers' perceptions of exercise, patients' and controls' benefits and barriers subscores were similar (p=0.539, p=0.439) (Table 3). Overall, the

most frequently recorded exercise benefits were "Exercise increases my stamina", "Exercise improves my flexibility" and "Exercise increases my muscle strength" in both groups. The most frequently recorded barriers of exercise in patients' group were "Exercise tires me", "I am fatigued by exercise" and "Places for me to exercise are too far away". Control group also reported similar barriers as "Exercise tires me", "I am fatigued by exercise" and "There are too few places for me to exercise". Most frequently reported benefits were on physical performance category and barriers were on physical exertion and exercise environment categories.

On analysis of the correlations between patients' perceptions of exercise with disease parameters, a negative correlation was

Table 1. Demographic characteristics and disease characteristics of the participants

		Patients (n=200)	Controls (n=100)	p-value
Age (years) (mean ± SD)		38.76±9.60	36.51±10.40	0.065
BMI (kg/m²) (meant ± SD)		26.90±4.08	26.16±4.20	0.145
Gender (M/F)		118/82	50/50	0.139
Years of education (mean ± SD)		8.55±3.55	9.9±3.7	**0.002**
Married, n (%)		168 (84)	71 (71)	**0.002**
Employed, n (%)		122 (61)	78 (78)	**0.003**
Smoking history, n (%)		64 (32)	37 (37)	**0.038**
Duration of symptoms (years) (mean ± SD)		11.8±8.5	-	-
Time since diagnosis (years) (mean ± SD)		6.2±6.6	-	-
BASDAI score (mean ± SD)		3.93±2.3	-	-
BASFI score (mean ± SD)		2.95±2.4	-	-
BASMI score (mean ± SD)		2.98±2.2	-	-
ASDAS-CRP (mean ± SD)		2.50±1.02	-	-
ASDAS-ESR (mean ± SD)		2.76±0.97	-	-
Total back pain score (mean ± SD)		4.09±2.9	-	-
Nocturnal back pain score (mean ± SD)		3.86±2.9	-	-
Activity back pain score (mean ± SD)		4.04±2.9	-	-
Patient global score (mean ± SD)		4.08±2.9	-	-
CRP (mg/L) (mean ± SD)		9.76±26.8	-	-
ESR (mm/h) (mean ± SD)		25.07±16.8	-	-
Primary pharmacological management				
	NSAID, n (%)	80 (40)	-	-
	Sulphasalazine, n (%)	79 (39.5)	-	-
	Anti-TNF agent, n (%)	41 (20.5)	-	-
Physical activity (IPAQ-S)		-	-	0.204
	Low, n (%)	47 (23.5)	33 (33)	-
	Medium, n (%)	124 (62)	53 (53)	-
	High, n (%)	29 (14.5)	14 (14)	-

SD: Standard deviation, BMI: Body mass index, M: Male, F: Female, BASDAI: Bath AS Disease Activity Questionnaire, BASFI: Bath Ankylosing Spondylitis Functional Index, BASMI: Bath AS Metrology Index, ASDAS-CRP: AS Disease Activity Score-C-reactive protein, ASDAS-ESR: AS Disease Activity Score-Erythrocyte Sedimentation Rate

Table 2. Types and minutes of exercise participation of the volunteers last week

	Patients (n=200) (min./week) (mean ± SD)	Controls (n=100) (min./week) (mean ± SD)	p-value
Walking	254.9±292.4	272.3±264.2	0.197
Stretching exercises	51.8±91.9	3.65±23.6	**0.001**
Indoor aerobic exercises	17.5±66.6	32.7±85.5	**0.038**
Weight training	17.9±88.7	15.6±83.1	0.881
Swimming	6.93±32.2	1.2±12	0.062
Football	3±16.7	0.6±6	0.151

min.: Minimum, SD: Standard deviation

found between barriers score with disease activity measured with BASDAI, functional index, depression scores, and fatigue. More negative perception of exercise was correlated with higher disease activity. There was also a positive correlation between barriers score and quality of life. A negative correlation was found between BMI and depression scores with PA. A positive correlation was found between physical quality of life with PA (Table 4).

Patients reported some barriers such as "Exercise tires me" (p=0.004) and "Exercise takes too much time" (p=0.011) more than control subjects. Patients also less frequently reported the benefit "I enjoy exercise" (p=0.04) than controls.

Significant correlations were observed between some questions of EBBS with disease characteristics of the patients. A negative correlation was observed between barrier statements "Exercise tires me", "I am fatigued by exercise" and "Exercise is hard work" with disease activity, functional limitations, lower mobility, depression, fatigue and a positive correlation was observed with quality of life. "Places for me to exercise are too far away" and "Exercise facilities do not have convenient schedules for me" statements were negatively correlated with depression and positively correlated with mental quality of life. A negative correlation was observed between the benefit statement "Exercise gives me a sense of personal accomplishment" with disease activity and depression. "Exercise allows me to continue my normal activities without fatigue" and "I enjoy exercise" statements were also negatively correlated with depression scores (Table 5).

Table 3. Comparison of fatigue and depression scores, quality of life and exercise perceptions of patient and control groups

	Patients (n=200)			Controls (n=100)			
	Mean ± SD	Min.	Max.	Mean ± SD	Min.	Max.	p-value
VAS-fatigue	4.45±3.07	0.0	10	4.15±2.25	0.0	10	0.907
Beck D.	10.81±8.73	0.00	44.00	7.3±6.48	0.00	39.00	**0.001**
SF12 PCS	40.05±9.72	19.60	59.10	48.39±6.98	30.60	60.40	**0.000**
SF12 MCS	45.61±11.02	15.30	67.80	49.33±8.60	29.30	62.50	**0.007**
Benefits EBBS	89.29±12.77	51.00	116.00	88.56±13.35	55.00	114.00	0.539
Barriers EBBS	39.34±5.73	24.00	56.00	40.06±5.7	24.00	56.00	0.439

Min.: Minimum, max.: Maximum; Beck D.: Beck Depression Scale, SF12 PCS: Short Form 12 Physical subscore, SF12 MCS: Short Form 12 Mental subscore. Benefits EBBS: Benefits subscore of Exercise Benefits Barriers Scale, Barriers EBBS: Barriers subscore of Exercise Benefits Barriers Scale

Table 4. The relationship between physical activity and perceptions of exercise of the patients with BMI, fatigue, depression, quality of life, disease activity, functional and mobility indices (Spearman Correlation Analysis)

		Physical activity (IPAQ-S)	Benefits EBBS	Barriers EBSS
BMI	r	**-0.141**	0.101	-0.107
	p	**0.047**	0.156	0.134
VAS-fatigue	r	-0.017	-0.010	**-0.214**
	p	0.811	0.892	**0.002**
Beck D.	r	**-0.143**	-0.077	**-0.158**
	p	**0.046**	0.278	**0.027**
SF12PCS	r	**0.140**	0.006	**0.139**
	p	**0.049**	0.929	**0.050**
SF12MCS	r	0.041	0.092	**0.156**
	p	0.569	0.195	**0.028**
BASDAI	r	-0.032	-0.062	**-0.188**
	p	0.657	0.387	**0.008**
ASDAS-CRP	r	-0.099	-0.112	-0.126
	p	0.167	0.114	0.075
ASDAS-ESH	r	-0.105	-0.120	-0.101
	p	0.139	0.091	0.156
BASFI	r	-0.073	-0.070	**-0.222**
	p	0.305	0.327	**0.002**
BASMI	r	-0.110	0.042	-0.128
	p	0.125	0.551	0.071

Discussion

Regular exercise has clearly numerous benefits. Exercise motivation is affected by many factors such as personal beliefs, cultural or family habits. Effective interventions are required to increase the likelihood of long-term changes in exercise behavior. According to a recent study an intervention should include (1) behavior change guidance, such as individualized education, motivational interviewing, goal setting, action planning, monitoring, and feedback (2) therapist training on how to tailor and practice an exercise program and provide behavior change guidance, and (3) encouragement to exercise in a group, to optimize exercise behavior in people with axSpA (21).

In the present study, 65% of the patients and 61% of the controls met WHO recommendations regarding PA time. In contrast to earlier studies reporting lower PA in axial SpA patients than controls (11,12), our work revealed similar PA levels on both groups. In the literature about PA of SpA patients, the highest rate was from a Swedish study, in which 68% of the patients met the exercise recommendations (22). In a study from France, 55% of the patients with axial SpA met the recommendations (23), and in a study from Canada, this rate was 47.5% (6). In a Norwegian study using the IPAQ, carried out during both summer and winter seasons, 41-61% of patients with axial SpA met health-enhancing PA (7). Our findings were a bit higher than most of the literature results, which reflected cultural differences in exercise methods and our result was similar to Turkish population controls.

Interestingly, in the present study PA of the patients was not associated to SpA features (BASDAI, ASDAS CRP, BASFI, BASMI, or anti TNF treatment). An association between higher disease activity with decreased PA participation was reported in the literature (7,24). In a cross-sectional study conducted on 20 patients with AS with interview technique, it was found that anti-TNF therapy increased the exercise rate and motivation of the patients, and it was thought that this effect was achieved by improving the pain, stiffness fatigue and psychological state of the patients (25). This finding may be consistent with our results, considering the functionality and mobility of the patients on anti-TNF treatment were significantly worse than those who did not use it, the PA levels was similar to others.

Adults with SpA engage in a variety of physical activities. In our group most frequently reported type of exercise was walking. In a study evaluating the effect of walking intervention in patients with AS, improved aerobic capacity and walking distance were found but the intervention did not provide additional benefits in disease activity, functional capacity, mobility and quality of life (26).

Stretching exercises are recommended to maintain spinal mobility in patients with SpA in systematic reviews (27). A study from Canada determined that 33% of patients with SpA regularly engaged in stretching exercises (6). Another study from Sweden concluded that 26% of patients with SpA executed spinal mobility exercises (7). Our findings revealed that 17% of the patients engaged in stretching exercises regularly, which was a bit lower than the literature. The reason for patients performing

Table 5. Significant correlations of some EBBS questions with disease parameters

		BMI	VAS-fatigue	Beck D.	SF12 PCS	SF12 MCS	BASDAI	ASDAS-CRP	ASDAS-ESR	BASFI	BASMI
Exercise tires me	r	**-0.197**	**-0.291**	**-0.221**	**0.288**	**0.211**	**-0.316**	**-0.254**	**-0.226**	**-0.307**	**-0.192**
	p	**0.005**	**0.001**	**0.002**	**0.001**	**0.003**	**0.001**	**0.001**	**0.001**	**0.001**	**0.007**
I am fatigued by exercise	r	-0.138	**-0.252**	**-0.220**	**0.254**	**0.184**	**-0.233**	-0.096	-0.134	**-0.185**	-0.076
	p	0.051	**0.001**	**0.002**	**0.001**	**0.009**	**0.001**	0.178	0.058	**0.009**	0.286
Exercise is hard work	r	-0.116	**-0.159**	**-0.236**	**0.157**	**0.195**	**-0.169**	**-0.148**	**-0.144**	**-0.183**	**-0.140**
	p	0.101	**0.025**	**0.001**	**0.027**	**0.006**	0.017	**0.036**	**0.043**	**0.010**	**0.048**
Exercise facilities do not have convenient schedules for me	r	-0.065	-0.078	**-0.171**	0.001	**0.154**	-0.113	-0.086	-0.025	-0.080	-0.027
	p	0.363	0.273	0.016	0.988	**0.030**	0.111	0.226	0.723	0.258	0.702
Places for me to exercise are too far away	r	-0.122	-0.142	-0.172	0.1	**0.171**	-0.112	-0.102	-0.070	-0.103	**-0.140**
	p	0.085	0.045	0.015	0.161	**0.016**	0.114	0.150	0.324	0.147	**0.047**
Exercise gives me a sense of personal accomplishment	r	0.124	-0.038	-0.129	0.089	0.084	-0.090	**-0.145**	**-0.169**	-0.102	0.054
	p	0.081	0.59	0.071	0.209	0.236	0.206	**0.041**	**0.017**	0.151	0.445
Exercise allows me to continue my normal activities without fatigue	r	0.065	-0.071	**-0.142**	0.053	0.112	-0.077	-0.042	-0.045	-0.021	0.085
	p	0.362	0.32	**0.045**	0.461	0.115	0.280	0.556	0.526	0.769	0.230
I enjoy exercise	r	0.05	-0.081	**-0.164**	0.128	0.135	-0.085	-0.101	-0.075	-0.107	-0.012
	p	0.483	0.252	**0.021**	0.071	0.058	0.230	0.156	0.294	0.130	0.871

BMI: Body mass index, VAS: Visual analog scale, Beck D.: Beck Depression Scale, EBBS: Exercise Benefits and Barriers Scale, PCS: Short Form 12 Physical subscore, Short Form 12 Mental subscore, BASDAI: Bath AS Disease Activity Questionnaire, ASDAS-CRP: AS Disease Activity Score-C-reactive protein, ASDAS-ESR: AS Disease Activity Score-Erythrocyte Sedimentation Rate, BASFI: Bath Ankylosing Spondylitis Functional Index, BASMI: Bath AS Metrology Index

stretching exercises more than controls might be a result of the emphasis on stretching exercises by health care professionals.

Patients' daily activities accounted for the majority of their PA. Control group had a higher engagement in aerobic activities. Energy expenditure of aerobic exercises such as fitness and pilates (>6 MET) is higher than walking (3.3 MET) and stretching exercises (3.5 MET). Patients should be encouraged to attend higher intensity exercises because of the increased risk for cardiovascular events (28).

Improved physical fitness was reported as the main benefit of exercise by patients as mentioned previously (6,22,29). Fatigue, pain, stiffness and disability were the most frequently reported barriers of patients with SpA in the literature (6,29,30). We found only one study that was comparing exercise perceptions of patients with SpA with population controls (29).The present study showed that higher number of patients with SpA reported fatigue and lack of time and places to exercise as barriers for being physically active than population controls. Also, the benefit item "exercise is enjoying" was less agreed than controls. Since exercise is considered as time consuming by the patients, the family support is essential. Supervision by a health professional who is familiar with both rheumatic diseases and exercise appears to be important. Health professionals should be aware of personal preferences and include them into exercise prescriptions. Furthermore, exercise groups for patients with SpA may help them maintain their exercise routines. During times of increasing symptoms and personal setbacks, social connections among patients with the same disease and similar physical limits may boost motivation to continue exercising (31,32).

As far as we know, this is the first study exploring the effects of disease parameters of patients with SpA on perceived benefits and barriers to exercise. Patients reported "I am fatigued by exercise" and "Exercise is a hard work" as barriers and less reported "I enjoy exercise" and "Exercise gives me a sense of personal accomplishment" as benefits with concordance with higher disease activity, decreased functionality and flexibility. Adherence to PA increases when potential health benefits is understood and as the exercise period progresses, individuals experience increased satisfaction.

Patients reported more barriers about places of exercise while depression and fatigue scores increased and quality of life decreased. Fatigue is an important complaint that impairs the quality of life in patients with SpA. Fatigue in patients with SpA has been shown to decrease by exercise (33). Health care professionals should emphasize the benefits of PA on fatigue in patients with SpA.

A strength of the research was that controls were drawn randomly from the general population to match patients in terms of age, gender and residential area. Barriers to exercise related to disease itself was analyzed.

Study Limitations

The limitations of the study were as follows; barriers and benefits specific to SpA were not identified, but EBBS was used in many rheumatologic diseases (6,19,23) and to our knowledge there was no such a questionnaire specific to SpA population. PA levels were assessed by a self-reported questionnaire (IPAQ-S). There is a tendency to overestimate PA for questionnaires compared with accelerometers (34) but it is a validated questionnaire that has been used previously in many studies and in several countries (7,29).

Conclusion

Heath care professionals may provide improved motivation for patients if they understand why and how they engage in PA. The results of this study suggest we should inform patients regarding the benefits of exercise, make efforts to eliminate perceived barriers to exercise and implement strategies (personal goal setting, monitoring, and feedback etc.) aimed at change of behaviors. Resources (access, time, finances) of exercise for patients should be increased.

Ethics

Ethics Committee Approval: Ethical approval was obtained from the Bezmialem Vakıf University's Clinical Research Ethics Committee (approval number: 71306642/050-01-04/81).

Informed Consent: All participants signed informed consent.

Peer-review: Externally peer reviewed.

Authorship Contributions

Concept: K.G., S.E.D., A.R., T.A., Design: K.G., S.E.D., M.G.G., T.A., Data Collection or Processing: K.G., S.E.D., M.G.G., A.R., Analysis or Interpretation: K.G., S.E.D., M.G.G., A.R., T.A., Literature Search: K.G., S.E.D., A.R., Writing: K.G., S.E.D., M.G.G., A.R., T.A.

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