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COMPARISON OF FUNCTIONAL EXERCISE CAPACITY, PERIPHERAL MUSCLE STRENGTH, DYSPNEA AND QUALITY OF LIFE IN PATIENTS WITH PSORIASIS AND HEALTHY CONTROLS: A CROSS-SECTIONAL STUDY

PSÖRİYAZİSLİ HASTALARDA VE SAĞLIKLI KONTROLLERDE FONKSİYONEL EGZERSİZ KAPASİTESİ, PERİFERİK KAS KUVVETİ, NEFES DARLIĞI VE YAŞAM KALİTESİNİN KARŞILAŞTIRILMASI: KESİTSEL BİR ÇALIŞMA

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ABSTRACT

Objective: This study was aimed to compare the functional exercise capacity, upper and lower extremity muscle strength, dyspnea, fatigue, quality of life (QoL), level of physical activity (PA), and cardiovascular diseases knowledge level in patients with psoriasis and healthy individuals.

Method: Thirty-six patients and 36 healthy controls were included in the study. The functional exercise capacity [6 minutes walking test (6-MWT)], upper and lower extremity muscle strength (Dynamometer), dyspnea severity [Modified Medical Research Council Dyspnea scale (MMRC)], fatigue severity [Fatigue Severity Scale (FSS)], QoL [The Short Form 36 questionnaire (SF-36)], PA [The International Physical Activity Questionnaire (IPAQ)], cardiovascular diseases knowledge level [Risk Factors in Cardiovascular Disease Knowledge Level (CARRF-KL)scale], and disease severity [Psoriasis Area and Severity Index (PASI)] of the individuals were evaluated.

Results: Demographic characteristics were similar in patients [49(38.50-58) years, 16M/20F] and healthy controls [51(46.25-55) y, 23M/13F] ($p>0.05$). The 6-MWT distance, upper and lower extremity muscle strength, SF-36 subscales, IPAQ, and CARRF-KL scores were significantly lower; FSS and MMRC scores were higher in patients than controls ($p<0.05$).

Conclusion: Patients with psoriasis had decreased functional exercise capacity, upper and lower extremity muscle strength, increased perception of fatigue and dyspnea, reduced PA level, QoL, and cardiovascular diseases knowledge level compared with healthy controls. Patients with psoriasis should be directed to cardiac rehabilitation programs.

Key Words: Psoriasis, Exercise Test, Muscle Strength, Dyspnea, Physical Activity

ÖZ

Amaç: Bu çalışma psöriyazisli hastalar ve sağlıklı bireylerde fonksiyonel egzersiz kapasitesi, üst ve alt ekstremite kas kuvveti, dispne, yorgunluk, yaşam kalitesi (YK), fiziksel aktivite (FA) düzeyi ve kardiyovasküler hastalıklar bilgi düzeyinin karşılaştırılmasını amaçladı.

Yöntem: Çalışmaya 36 hasta ve 36 sağlıklı kontrol dâhil edildi. Bireylerin fonksiyonel egzersiz kapasitesi [6 dakika yürüme testi (6-DYT)], üst ve alt ekstremite kas kuvveti (Dinamometre), dispne [Modifiye Medikal Araştırma Kurulu Ölçeği (MMRC)], yorgunluk [Yorgunluk Şiddet Ölçeği (YŞÖ)], YK [Kısa Form 36 anketi (SF-36)], FA seviyesi [Uluslararası Fiziksel Aktivite Anketi (UFAA)], kardiyovasküler hastalıklar bilgi düzeyi [Kardiyovasküler Hastalıklar Risk Faktörleri Bilgi Düzeyi Ölçeği (KARRİF-BD)] ve hastalık şiddeti [Psoriasis Alan Şiddet İndeksi (PAŞİ)] değerlendirildi.

Bulgular: Hasta [49(38.50-58) yıl, 16E/20K] ve sağlıklı kontrollerin [51(46.25-55) y, 23E/13K] demografik özellikleri benzerdi ($p>0,05$). Hastalarda 6-DYT mesafesi, üst ve alt ekstremite kas kuvveti, SF-36 alt ölçek, UFAA, ve KARRİF-BD puanları kontrollere göre anlamlı olarak daha düşük; YŞÖ ve MMRC skorları daha yüksekti ($p<0,05$).

Sonuç: Psöriasisli hastaların, sağlıklı kontrollere göre fonksiyonel egzersiz kapasitesi, üst ve alt ekstremite kas kuvveti azalmış, yorgunluk ve nefes darlığı algısı artmış, FA düzeyi, YK ve kardiyovasküler hastalıklar bilgi düzeyi azalmıştı. Psöriasisli hastalar kardiyak rehabilitasyon programlarına yönlendirilmelidir.

Anahtar Kelimeler: Psöriyazis, Egzersiz Testi, Kas Gücü, Nefes Darlığı, Fiziksel Aktivite

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INTRODUCTION

Psoriasis is a chronic inflammatory disease that affects about 2% of the population and includes complicated pathogenic interactions between the innate and adaptive immune systems. The psoriasis cost is high for patients and healthcare systems [1]. Causes of psoriasis are unknown; however, several risk factors are suspected, including familial history and environmental dangers, such as smoking, alcohol, stress, and obesity. Also, psoriasis is associated with many chronic disorders, such as metabolic syndrome, cancer, and cardiovascular problems. In addition, the severity of the disease depends on heredity and environmental factors [2].

Exercise capacity, which reflects cardiorespiratory fitness, was lower in patients with psoriasis [3]. This decrease might be related to physical and psychosocial effects of psoriasis, such as disease severity, skin sensitivity, and participation in social/leisure activities [4]. In addition, cardiovascular function is impaired in patients with psoriasis [5]. However, little research has been focused on exercise capacity. Muscle strength is one of the most crucial components of physical fitness is known to decrease concerning chronic inflammation [6]. Psoriasis is characterized by chronic inflammation [1]; however, the effects of psoriasis on muscle strength are not known.

Psoriasis causes significant psychosocial disability and impacts patients' quality of life. Compared to many other dermatological disorders, patients with psoriasis have lower quality of life [7,8]. A harmful effect of psoriasis on social and leisure activities can inhibit participation in physical activity. Physical inactivity may lead to an increased rate of cardiovascular disease and the inherent risks associated with systemic inflammation and comorbidities associated with psoriasis [9]. Fatigue, related to physical inactivity and peripheral muscle strength, affects physical performance and daily living activities [10]. It is known that regular physical activity diminishes the risk of cardiovascular disease. However, patients with psoriasis have fewer exercise habits than most people, affecting their functional exercise capacity [11]. It is thought that psoriasis may have adverse effects on lung parenchyma associated with immune dysfunction [12]. However, there is no information about the severity of dyspnea in patients with psoriasis. In addition, knowledge about both psoriasis and cardiovascular disease is inadequate in patients [13]. Therefore, this study firstly aimed to compare the functional exercise capacity, peripheral muscle strength, dyspnea, fatigue, physical activity level, quality of life, and cardiovascular disease knowledge level in patients with psoriasis and healthy individuals. The secondary objective was to research the related factors of functional exercise capacity in patients.

METHOD

Participants

Sixty-one patients with psoriasis were directed from the department of dermatology between July 2021 to March 2022. The dermatologist performed the clinical evaluation of the patient and referred them to the physiotherapist for assessment according to the inclusion criteria. Twenty-two patients were excluded due to various problems (Figure 1).

Thirty-six patients and 36 healthy-matched individuals were compared. Patients aged between 18 and 70 years and diagnosed with chronic plaque-type psoriasis were included. Patients with psoriatic arthritis; musculoskeletal problems (osteoarthritis, osteopenia, fibromyalgia, traumatic fracture history etc.) with the potential to affect muscle strength or functionality; pulmonary diseases that would affect respiratory function such as COPD, asthma; acute infections, unstable hypertension, diabetes mellitus, heart failure, pregnant or breastfeeding, or these with any drug usage were excluded.

The non-interventional Clinical Researches Ethics Committee of the Hatay Mustafa Kemal University approved this study (No:2021/10). Informed consent was received from all individuals in the study conducted following the principles of the Declaration of Helsinki.

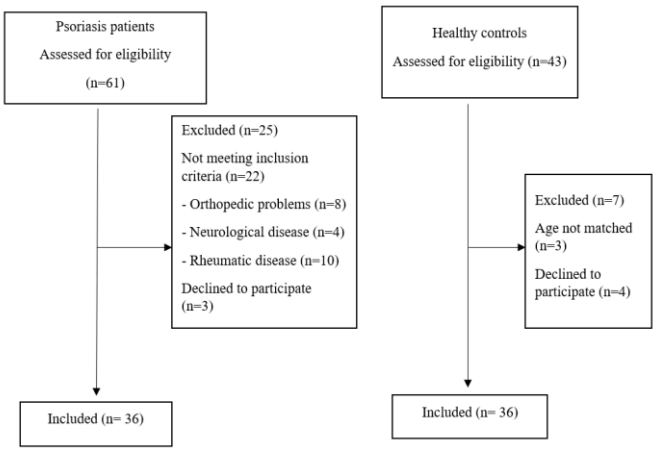

Figure 1. Flow diagram of the patients with psoriasis and healthy controls.

Study Design

In this cross-sectional study, a physiotherapist evaluated the functional exercise capacity, peripheral muscle strength, level of dyspnea, fatigue, physical activity level, quality of life, and cardiovascular disease risk factor knowledge level. The patient's peripheral muscle strength measurements were performed before the 6-minute walking tests (6-MWT.) Patients were rested at least 30 min between each test. All assessments were performed in approximately 2 hours. A dermatologist performed the patient's clinical assessment.

Demographic and clinical data were recorded. Individuals performed the 6-MWT, according to the American Thoracic Society criteria, to assess functional exercise capacity. Individuals walked in a 30 m corridor at their average speed. There was 30 min between the first and second test. The highest distance was recorded. A percentage of predicted values was used [14,15]. The 6-minute walking work (6-MWw) was calculated as the product of the greatest 6-MWT distance (in kilometres) and weight (in kilograms) [16].

A hand-held digital dynamometer (JTECH Power Track Commander, Baltimore, USA) was used to evaluate quadriceps femoris, hip flexors, shoulder abductors, and elbow flexors muscle strength. According to the reference values, the percentage of the predicted value was calculated [17]. A Jamar analogue hand dynamometer (PowerTrack II, JTECH Medical, Midvale, Utah, USA) was used to assess handgrip strength [18]. Measurements were performed three times, and the highest value was recorded.

Fatigue was evaluated with fatigue severity scale (FSS). This reliable and valid scale has nine items that score 0 to 7 [19]. The highest possible score is 63. Scores over 36 define severe fatigue [19].

The dyspnea severity was identified with Modified Medical Research Council (MMRC) scale. Grades of dyspnea were 0–4 [20].

The comorbidity level was identified with The Charlson Comorbidity Index (CCI). The index includes 19 medical conditions. As the total score increases, mortality risk increases [21].

The short form of the International Physical Activity Questionnaire (IPAQ) was used to evaluate physical activity levels. The walking time, moderate and vigorous-intensity activity, and sedentary activity are determined according to recorded minutes per week within every activity by a metabolic equivalent (MET) energy expenditure in this reliable and valid questionnaire [22]. IPAQ categorizes physical activity as inactive, minimally active, and sufficiently active based on the scores of total physical activities [22].

The quality of life was evaluated with The Short Form 36 (SF-36) questionnaire. There are 8 subscales of the SF-36. In this reliable and valid questionnaire, scores range from 0 to 100, and higher values indicate better health [23].

Cardiovascular disease risk factor knowledge level was evaluated with the Risk Factors in Cardiovascular Disease Knowledge Level (CARRF-KL) Scale. The scale is valid in Turkish and includes 28 items answered as yes, no, or do not know. Higher values show higher knowledge [24].

The severity of psoriasis was identified with the Psoriasis area and severity index (PASI). The PASI includes assessments of the head and neck, trunk, upper and lower limbs. The total score varies between 0 to 72; higher scores denote increased severity [25].

Ethical Approval

The non-interventional Clinical Researches Ethics Committee of Hatay Mustafa Kemal University approved this study (No:2021/10).

Statistical Analysis

The statistical analysis was conducted with SPSS 20.0 program (Armonk, NY; IBM Corporation). The G*Power software was used to identify sample size (G*Power 3.0.10 system, Franz Faul, Universität Kiel, Germany). Based on the FSS results of a prior study, at least twelve individuals for each group were calculated to detect a value of 0.05 with an effect size of 1.44 and 95% power [26]. The normality of data was identified with the Shapiro-Wilk test. Student's t-test was used to analyze normally distributed data. Data were expressed as mean (± standard deviation), mean difference, and 95% CI. Non-distributed data were compared with Mann–Whitney U test expressed as the median (IQR). The chi-square test was used to analyze nominal data. Pearson's and Spearman's rank correlation coefficients were used to calculating correlations between 6-MWT, demographic**,** and clinical factors. The level of significance was set to p<0.05.

RESULTS

Thirty-six patients with psoriasis and 36 healthy controls were compared (Figure 1). Demographics and clinical characteristics of patients and healthy controls were similar (p>0.05) except for the CCI (p=0.001) score (Table 1). According to PASI, 24 (66.7%) patients had mild psoriasis and 12 (33.3%) were considered mild to moderate.

Table 1. Demographic characteristics of patients with psoriasis and healthy control groups

Variables	Psoriasis patients Mean ± SD Median (IQR)	Control Mean ± SD Median (IQR)	Mean difference %95 CI	p
Age (years)	49(38.50-58)	51(46.25-55)		0.230
Sex (male/ female)	16/44.4%; 20/55.6%	23/63.9%; 13/36.1%		0.078
Weight, kg	80.50±19.42	78.63±10.85	1.86 (-5.53- 9.25)	0.617
Height, cm	166 (156.50-175)	167.50 (163.50-175.75)		0.219
BMI, kg/m^2	29.06 ± 6.28	27.43 ± 3.24	1.62 (-0.72- 9.97)	0.173
Smoking (pack-year)	0(0-15)	0(0-13.25)		0.955
Smoking (current/	12/33.3%;	12/33.3%;		
ex/	5/13.9%;	4/11.1%;		0.934
nonsmoker), n (%)	19/52.8%	20/55.6%		
CCI score	0(0-0.75)	0(0-0)		**0.001***
PASI score	6.2(0-12.50)			
Medical history				
Diabetes mellitus	6/16.7%			
Hypertension	9/25%			
Chronic coronary syndrome	3/8.3%			

*BMI: Body Mass Index; CCI: Charlson Comorbidity Index; PASI: The Psoriasis Area Severity Index; CI: Confidence Interval. *p<0.05.*

The 6-MWT distance (p<0.001) (Figure 2), 6-MWT% (p<0.001), 6MWw (p<0.001), measured and predicted quadriceps femoris (p<0.05), hip flexors (p<0.05), shoulder abductors (p<0.05), elbow flexors (p<0.05), handgrip muscle strength (p<0.05), IPAQ total physical activity (p=0.004), walking (p=0.009), vigorous activity (p=0.004), SF-36 subscales (p<0.05), and CARRF-KL (p<0.001) scores were significantly lower in patients with psoriasis compared to controls (Table 2,3).

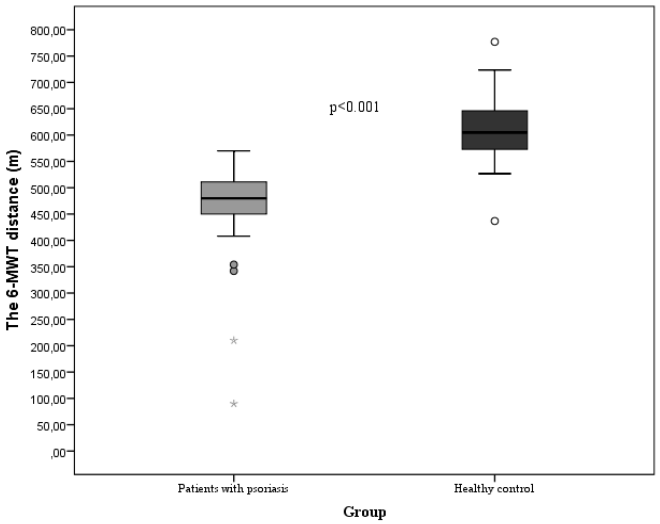

Figure 2. Six-minute walk test distance of the patients with psoriasis and healthy controls

Table 2. Comparison of 6-MWT parameters in patients with psoriasis and healthy control

6-MWT parameters	Psoriasis patients Mean ± SD Median (IQR)	Controls Mean ± SD Median (IQR)	Mean difference %95 CI	p
Distance, m	480 (450- 511.35)	604.80 (571.50-648)		**<0.001***
Distance, % predicted	69.50 (63.85-77.39)	91.52 (84.92-99.58)		**<0.001***
6MWw, kg·m	36857.38± 11122.57	47899.65± 8167.90	-11042.27 [(15629.31)- (-6455.22)]	**<0.001***
Heart rate, beats/min (resting)	81.61±13.01	81.83±12.11	-0.22 (-6.13-5.68)	0.940
Peak heart rate, beats/min	109.22±15.88	113.30 ± 19.21	-4.08 (-12.37-4.20)	0.329
Maximum heart rate, %	63.46±10.31	67.52±12.54	-4.05(-9.45-1.34)	0.139
SBP, mmHg (resting)	120 (110-140)	120 (110-123.75)		0.176
ΔSBP, mmHg	10 (0-20)	10 (10-30)		**0.026***
DBP, mmHg (resting)	80 (70-97.50)	75 (70-80)		**0.033***
ΔDBP, mmHg	0(-3.75-0)	10(0-10)		**0.003***
SpO_2, % (resting)	98 (97-98)	98 (97-98)		0.360
Δ SpO_2, %	0 ((-1)-1)	0 ((-1)-1)		0.944
Breathing frequency, breaths/min (resting)	24 (20-24)	22 (19.25-24)		0.579

Δ Breathing frequency, breaths/min	4 (4-8)	4.50 (4-8)		0.837
Dyspnea, 0-10 (resting)	0 (0-1.75)	0 (0-0)		**<0.001***
Δ Dyspnea, 0-10	1 (0-2.75)	0 (0-2)		0.108
Fatigue, 0-10 (resting)	1 (0-4.75)	0 (0-0)		**<0.001***
Δ Fatigue, 0-10	1.50 (0-3)	0 (0-2.75)		0.118
QF (Right), N	185.50 (110.75-210.75)	193 (180-230.50)		**0.039***
QF (Left), N	184 (112-211)	197.50 (180.50-27.50)		**0.022***
QF, % predicted	38.81 ±12.58	49.29±9.51	-10.48 [(-15.72)-(-5.23)]	**<0.001***
Hip flexors (Right), N	174.50 (134-207.75)	202 (180-217.75)		**0.011***
Hip flexors (Left), N	157 (123.50-210.5)	183 (168.25-211)		**0.030***
Hip flexors, % predicted	112.67±33.90	128.35±37.71	-15.68 (-32.54-1.16)	0.068
Shoulder abductors (Right), N	104 (77.55-151.50)	144.50 (112.50-176)		**0.001***
Shoulder abductors (Left), N	102 (77-159.25)	135 (104-165.75)		**0.007**
Shoulder abductors, % predicted	62.87 (46.27-74.05)	73.98 (66.37-93.43)		**0.003***
Elbow flexors (Right), N	116 (79.75-162.75)	160 (127.5-192.25)		**0.003***
Elbow flexors (Left), N	114 (80.30-140)	148 (125.25-202)		**<0.001***
Elbow flexors, % predicted	56.70±16.11	77.33±25.96	-20.63[(-30.79)-(-10.47)]	**<0.001***
Hand grip strength (Right), P	61 (48.50-81.75)	85 (65-94)		**0.004***
Hand grip strength (Left), P	60 (44.25-81.50)	79.50 (65.25-90)		**0.006***

*6-MWT: 6-Minute Walk Test, SBP: Sistolic Blood Pressure, DBP: Diastolic Blood Pressure, SpO_2: Oxygen Saturation, 6MWw: 6-Minute Walk Distance x Body Weight; N: Newton; P: Pound; CI: Confidence Interval, QF: Quadriceps Femoris, *p<0.05.*

FSS (p<0.001), MMRC (p<0.001), and IPAQ sitting duration (p=0.043) were higher in patients than in controls (Table 3). Quadriceps femoris strength was less than 80% of the predicted in all patients (100%), hip flexor strength in 6 (16.7%) patients, shoulder abductor strength in 31 (86.1%) patients, and elbow flexor muscle strength in 33 (91.7%) patients. Eighteen (50%) patients reported severe fatigue. Twenty-two (61%) patients were inactive, 11 (30.6%) were minimally active, and 3 (8.3%) were sufficiently active, while 14 (38.9%) of the controls were inactive, 11 (30.6%) were minimally active, and 11 (30.6%) were sufficiently active (p=0.042).

Correlations

The 6-MWT distance was significantly related to age (r=-0.440, p=0.007), BMI (r=0.436, p=0.008), medical history (r=0.369, p=0.027), PASI score (r=-0.512, p=0001), quadriceps femoris (r=0.363, p=0.029) and handgrip muscle strength (r=0.342, p=0.041), CCI score (r=-0.343, p=0.041), MMRC score (r=-0.340, p=0.042), 6-MWT% (r=0.523, p=0.001), and moderate physical activity score (r=0.360, p=0.031).

Table 3. Comparison of fatigue, dyspnea, cardiovascular disease knowledge level, physical activity level and quality of life in patients with psoriasis and healthy control

Variables	Psoriasis patients Mean ± SD Median (IQR)	Control Mean ± SD Median (IQR)	Mean difference %95 CI	p
FSS score (0-63)	37 (20.25-54.75)	13 (5.25-31.75)		**<0.001***
MMRC score (0–4)	1(0-1.75)	0(0-0)		**<0.001***
CARRF-KL score	22(18-23)	25(23-26)		**<0.001***
IPAQ (MET-min/week)				
Total	371.25 (66-1367.25)	1039.50 (352.87-296.25)		**0.004***
Walking	198 (16.50-448.50)	441 (198-1299.37)		**0.009***
Moderate	0(0-0)	0(0-420)		0.108
Vigorous	0(0-0)	0(0-570)		**0.004***
Sitting (min/day)	360 (195-525)	240 (180-420)		**0.043***
SF-36 subscales (0-100)				
Physical functioning	90 (65-95)	100 (90-100)		**0.002***
Role limitations due to physical health	75 (75-100)	100 (100-100)		**<0.001***
Role limitations due to emotional problems	100 (0-100)	100 (100-100)		**0.001***
Energy/fatigue	41.52±24.31	74.58±13.54	-33.05 [(-42.30)-(-23.80)]	**<0.001***
Emotional well-being	60(48-67)	80(65-88)		**<0.001***
Social functioning	75(62.50-100)	100(78.12-100)		**0.008***
Pain	57.50(35-90)	95(77.50-100)		**<0.001***
General health	55(26.25-70)	85(65-90)		**<0.001***

*FSS: Fatigue Severity Scale, MMRC: Modified Medical Research Council Dyspnea Scale, CARRF-KL: Cardiovascular Disease Risk Factors Knowledge Level Scale, IPAQ: International Physical Activity Questionnaire, SF-36: Short-Form 36, CI: Confidence Interval, *p<0.05.*

DISCUSSION

The main findings of the current study are: (1) functional exercise capacity and upper and lower extremity muscle strength were impaired; (2) fatigue and dyspnea levels were increased; (3) physical activity level, quality of life and cardiovascular disease risk factor knowledge levels were reduced in patients with psoriasis than controls; and (4) age, BMI, medical history, PASI score, quadriceps femoris and handgrip muscle strength, CCI score, MMRC dyspnea score, 6-MWT%, and moderate physical activity score were associated with functional exercise capacity.

Psoriasis is recognized as a risk factor for cardio-metabolic disorders [4]. Also, it was seen that myocardial infarction, cardiovascular mortality, and all-cause mortality rates were higher in patients with severe psoriasis [2]. Therefore, evaluating the exercise capacity of

patients with psoriasis is essential. Wilson showed that patients with psoriasis had lower VO2 max than controls [4]. Another study stated that patients with psoriasis and healthy controls had similar maximal exercise capacity. [27]. In the current study, the 6-MWT distance was higher in controls than in patients with psoriasis [480 (450- 511.35) m versus 604.80 (571.50-648) m]. The difference from the abovementioned study [27] might result from the patients in their study being younger. Also, the current study firstly showed that 6MWw was lower in patients with psoriasis than in controls. 6MWw should be preferred when a cardiopulmonary exercise test cannot be performed as it reflects better work of walking than 6-MWT distance [16]. In addition, 6-MWT was negatively related to PASI and comorbidities in the present study. It is known that severe psoriasis has been related to increased mortality of cardiovascular diseases. Therefore, patients should be directed to cardiac rehabilitation. Also, new studies are needed investigating the effects of rehabilitation interventions that may improve exercise capacity. Furthermore, the effects of disease severity on functional exercise capacity should be investigated.

Peripheral muscle strength has been reduced in patients with psoriatic arthritis [28]. The current study is the first to provide information about peripheral muscle involvement in patients with psoriasis. The current study showed that both upper and lower extremity muscles were weakened in patients with psoriasis. Also, 6-MWT is correlated with quadriceps femoris muscle and handgrip strength. It was stated that chronic inflammation is related to decrease skeletal muscle strength and mass [6]. A reduction in peripheral muscle strength may be due to the chronic inflammatory process of psoriasis. More research is required to comprehend muscle weakness's origin in patients with psoriasis.

Information about the reason for fatigue is unclear, although it is more common in patients with psoriasis [10,26]. Rosen et al. reported that 25% of the patients with psoriasis endured severe fatigue 10]. Skoie et al. showed that severe fatigue was encountered by 50% of the patients with psoriasis. In addition, they stated that the severity of fatigue was related to smoking, pain, and depression but not to psoriasis severity [26]. In the current study, 50% of the patients suffered from severe fatigue, which is in accordance with the literature. Fatigue might be related to physical inactivity, impaired quality of life, decreased muscle strength and exercise capacity. For this reason, more studies investigating the reason for fatigue are needed better to identify mechanisms regarding fatigue in patients with psoriasis.

Dyspnea is a widespread symptom of cardiorespiratory diseases, such as chronic obstructive pulmonary disease (COPD) and heart failure [29]. The underlying mechanisms need to be clarified due to covering the intertwined functions of the peripheral and central neural systems [29]. The relationship between chronic inflammation and dyspnea was shown in patients with COPD and heart failure [30]. A 1.45-fold increased risk of COPD in psoriasis patients was stated in a study [31]. Also, psoriasis might affect the lung parenchyma with an abnormal immunologic response [12]. In the current study, although patients with pulmonary diseases were excluded from our study, patients with psoriasis had higher dyspnea perception than controls. Also, dyspnea was negatively correlated with 6-MWT distance. Dyspnea may be related to decreased exercise capacity. More attention should be paid to signs of dyspnea, and more studies are needed to identify the underlying mechanism of dyspnea in patients with psoriasis.

Physical inactivity has been shown in patients with psoriasis due to various psychological or other barriers [9,11,32]. The severity of disease, quality of life, social avoidance, and air condition lead to reduce physical activity [9,11,32]. A research stated that 52.8% of patients were inactive [11]. Another study showed that 51.1% of the patients had low to moderate physical activity levels [9]. In addition, it was stated that patients with psoriasis would benefit from physical activity to alleviate chronic inflammation and cardio-metabolic comorbidities [9,33]. Similar to the findings of these studies, in the current study, physical activity level was lower in patients with psoriasis than in controls. Twenty-two (61%) patients were inactive, 11 (30.6%) were minimally active, and 3 (8.3%) were sufficiently active. Also, physical activity was related to 6-MWT in the present study. Physical activity counselling should be added to rehabilitation programs.

A reduction in quality of life was shown in patients with psoriasis [7,33]. Disease symptoms such as burning and itching, older age, female gender [7], family history of psoriasis, and other chronic diseases [33] cause impairment in the quality of life in patients with psoriasis. In the current study, quality of life was impaired in patients with psoriasis compared to controls, which is in accordance with the literature. In addition, 16.7% of the patients had diabetes mellitus, 25% had hypertension, and 8.3% had a chronic coronary syndrome. Fatigue, dyspnea, physical inactivity, and comorbidities might impair quality of life.

In the current study, the cardiovascular disease risk factor knowledge level was higher in controls than in patients with psoriasis. Wahl et al. stated that the knowledge level about psoriasis was lower in patients with psoriasis, and many patients did not know the association of psoriasis with cardiovascular disease [13]. Considering that the risk of cardiovascular disease is higher in those with psoriasis, more attention should be paid to patient education about cardiovascular disease.

Limitations

The current study has some limitations. The 6-MWT, a valid and reliable test, was used to assess exercise capacity [14]. Due to technical problems, a cardiopulmonary exercise test was not conducted, but it should be used in future studies. Secondly, physical activity was assessed using a questionnaire. Although the IPAQ is a practical, standardized, and cost-effective questionnaire [22], new studies should use accelerometers.

CONCLUSION

This study firstly showed a reduction in upper and lower extremity muscle strength and increased dyspnea levels in patients with psoriasis. In addition, physical activity level, exercise capacity, quality of life, and knowledge level about cardiovascular diseases are decreased, and fatigue level is increased in patients with psoriasis. New studies are needed to improve outcomes for patients with psoriasis. Cardiac rehabilitation programs should be conducted, including exercise training, physical activity counselling, and patient education.

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