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PREDICTORS OF FEAR OF MOVEMENT IN PATIENTS WITH RHEUMATOID ARTHRITIS

ORIGINAL ARTICLE

ABSTRACT

Purpose: Patients with rheumatoid arthritis (RA) frequently have experience difficulties during daily activities since decrease in upper and lower extremity functions. The aim of this study was to investigate the association between fear of movement and age, upper and lower extremity function and functional disability in patients with RA.

Methods: A total of 88 patients (mean age: 56.01±11.51 years) with RA participated in the study. Disease activity was assessed using the Disease Activity Score in 28 joints (DAS28). Functional disability was assessed using the Health Assessment Questionnaire-Disability Index (HAQ-DI). The Disabilities of the Arm, Shoulder and Hand Score (QuickDASH) was used to assess upper extremity function. The Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) was used to evalute the lower extremity function. The Tampa Scale for Kinesiophobia (TSK) was used to assess pain-related fear of movement. The multiple stepwise linear regression model with R-square (R^2) was used to compare across the models and explain the total variance.

Results: Eight independent variables namely, age (r=0.215, p=0.044), QuickDASH (r=0.504, p<0.001), HAQ-DI (r=0.315, p=0.003), WOMAC Pain (r=0.512, p<0.001), WOMAC Stiffness (r=0.419, p<0.001), WOMAC Function (r=0.398, p<0.001), WOMAC Total (r=0.429, p<0.001), WOMAC range (r=0.419, p<0.001), demonstrated significant correlations with TSK. Besides, there were correlations between two independent variables (QuickDASH, p=0.013, WOMAC Pain, p=0.034) and TSK (R^2=0.293).

Conclusion: The results of the study suggested that fear of movement was likely to be associated with poorer upper extremity functional disability and lower extremity pain levels in spite of varied drug therapies in patients with RA. Therefore, assessment of upper and lower extremity function and related factors should be a part of rehabilitation process for a complimentary treatment.

Key Words: Arthritis; Fear; Function: Movement; Rheumatology.

ROMATOİD ARTRİTLİ HASTALARDA HAREKET ETME KORKUSUNUN BELİRLEYİCİLERİ

ARAŞTIRMA MAKALESİ

ÖZ

Amaç: Romatoid artritli (RA) hastalarda günlük yaşantılarında üst ve alt ekstremite fonksiyonlarındaki azalma sebebiyle genellikle sorun yaşamaktadır. Bu çalışmanın amacı, RA hastalarında hareket korkusunun yaş, alt ve üst ekstremite fonksiyonları ve fonksiyonel bozukluklar ile ilişkisini incelemekti.

Yöntem: Bu çalışmaya 88 RA'lı (yaş: 56,01±11,51 yıl) hasta dahil edildi. Hastalık aktivitesinin değerlendirilmesinde Hastalık Aktivite Skoru-28 (DAS-28) ve fonksiyonel bozuluklukların değerlendirilmesinde Sağlık Sorgulama Formu-Bozukluk İndeksi (HAQ-DI) kullanıldı. Üst ekstremite fonksiyonelliğinin değerlendirilmesinde Kol, Omuz, El Sorunları Anketi Kısa Versiyonu (QuickDASH) kullanılırken, alt ekstremite fonksiyonelliği için Western Ontario ve McMaster Universiteleri Osteoartrit Indeksi (WOMAC) kullanıldı. Ağrıya bağlı hareket korkusunu değerlendirmek için, Tampa Kinezyofobi Ölçeği (TKÖ) kullanıldı. Analizlerin yapılmasında R kare ile (R^2) çok aşamalı doğrusal regresyon analizi kullanıldı.

Sonuçlar: Yaş (r=0,215, p=0,044), QuickDASH (r=0,504, p<0,001), HAQ-DI (r=0,315, p=0,003), WOMAC ağrı (r=0,512, p<0,001), WOMAC tutukluk (r=0,419, p<0,001), WOMAC fonksiyon (r=0,398, p<0,001), WOMAC toplam (r=0,429, p<0,001), WOMAC yüzdesi (r=0,419, p<0,001) gibi sekiz bağımsız değişken ile TKÖ puanı arasında korelasyon bulundu. Ayrıca, QuickDASH, (p=0,013) ve WOMAC ağrı (p=0,034) ile TKÖ arasında korelasyon olduğu görüldü (R^2=0,293).

Tartışma: Çalışmanın sonuçları, RA hastalarında ilaç tedavilerine rağmen var olan hareket etme korkusunun üst ekstremite fonksiyonlarındaki yetersizlikler ve alt ekstremitelerdeki ağrı ile ilişkili olabileceğini göstermiştir. Bu nedenle, üst ve alt ekstremite fonksiyonları ve bunlarla ilişkili faktörlerin incelenmesi rehabilitasyon sürecinin tamamlayıcı bir parçası olmalıdır.

Anahtar Kelimeler: Artrit; Korku; Fonksiyon; Hareket; Romatoloji.

INTRODUCTION

Rheumatoid arthritis (RA) is a systemic chronic autoimmune inflammatory disease characterized by synovial joint inflammation that results in functional limitations accompanied by social and psychological outcomes (1,2). RA is typically progressive with high functional disability levels in later stages (1). RA is one of the most common disorders causing hand impairment in rheumatologic diseases. Although effective drug therapies have led to a major improvement in outcomes (2), RA patients still report significant functional impairments in their daily lives (3,4). Clinical global assessments and laboratory parameters such as erythrocyte sedimentation rate (ESR) or C-reactive protein (CRP) usually do not reflect the extent of functional disability in terms of patients' perspective. In addition, patients' expectations regarding relief from pain and ability to perform physical activities with their upper and lower extremities varies despite of drug therapies.

Research supporting the benefit of aerobic and strengthening exercises in cases of RA indicate that fear-avoidance beliefs about physical activity have been found to be associated with high levels of pain, poor health-related quality of life and low levels of physical activity (5-7).

One of the most common symptoms of RA is pain, which results in an avoidance of physical activity accompanied by decreased social activities and increased social isolation (1). Studies have examined the predictors of health-related quality of life in RA patients regarding to sociodemographics and disease-related variables (8-10). Although disease-modifying antirheumatic drugs (DMARDs) therapy alone or in combination have been the mainstay of RA treatment, studies have largely underestimated the need to investigate the contribution of fear of movement, especially on the perspective of patient-reported outcomes (PROs).

In the literature, kinesiophobia, in other definition the fear of movement, is generally assessed either using the Fear-Avoidance-Belief Questionnaire or the Tampa Scale of Kinesiophobia (TSK) in patients with chronic musculoskeletal pain. Furthermore, fear-of-movement beliefs were found to be associated with high levels of pain, low health-related quality of life and physical activity in adults with RA in only one study (5,11).

Recently, TSK has also been used to evaluate fear of movement in several disease (12-14). The TSK has been shown to identify the incidence of pain-related fear of movement in patients with chronic pain, including back pain, hip and knee osteoarthritis, in order to determine the effects of kinesiophobia on function and activity level (12,15). Results of these studies indicate that pain coping and social support, assessed very early in the disease process, can affect long-term functional disability and pain in RA, and suggest that early interventions focusing on pain-related avoidance factors and social resources for patients at risk may beneficially influence long-term outcomes in RA (12,15). However, there is still a need for disease-specific fear of movement assessments in patients with RA.

To the best of our knowledge, no studies have examined the associations between fear of movement, upper and lower extremity functional disability as a predictor of kinesiophobia in patients with RA. The aim of this study was to examine the potential predictors of fear of movement in patients with RA. We hypothesized that fear of movement in RA patients would associate with upper and lower extremity functions.

METHODS

We used a cross-sectional, descriptive design in this study. Patients were recruited from a university-affiliated hospital rheumatology outpatient clinic after visits for consultations, blood tests, and follow-ups. The study population included patients examined by three rheumatologists. The patients all had to fulfill the American College of Rheumatology (ACR) classification criteria for RA with the inclusion criteria including an age of at least 18 years, the ability to read, speak, and write in Turkish, and the willingness to provide written consent (16). Patients with cognitive and mental problems or current severe comorbidities such as cancer or cardiovascular diseases were excluded.

A total of 88 patients (aged between 29 and 79 years) being under treatment with classical DMARDs (n=31); biological DMARDs (n=33), and the combined classical DMARDs therapy (n=24)

were included in the analysis through February-August 2016. The institutional ethics committee approved the study (ECN: 18-385).

A trained researcher distributed the questionnaires and written instructions to the patients. Disease duration was defined as the interval between when the first diagnosis of RA and the date that the questionnaire was filled out.

We assessed disease activity in RA patients using the Disease Activity Score in 28 joints (DAS28), which included an assessment of the visual analogue scale (VAS) for pain, the number of tender joints, the number of swollen joints, and the ESR. Patients with DAS28 scores higher than 5.1 were considered to have active disease/high disease activity, a DAS28 below 3.2 indicated low disease activity. A patient was considered to be in remission if he or she had a DAS28 score lower than 2.6 (17).

We assessed functional disability using the Health Assessment Questionnaire-Disability Index (HAQ-DI). The HAQ-DI consists of 20 items measuring physical disabilities over the past week in eight categories of daily living: Dressing and grooming, getting up, eating, walking, hygiene, reach, grip, and usual activities. Each item is scored on a 4-point rating scale from 0=without any difficulty to 3=unable to do (18). The alternative disability index, which does not take into account the use of aids and devices or help from others, was used in this study.

We determined the highest score in each of the eight categories and then averaged the category scores to calculate each patient's total HAQ-DI score. The total HAQ-DI scores ranged from 0–3, with higher values indicating more disability.

We used the Disabilities of the Arm, Shoulder and Hand (QuickDASH) score to assess the ability of a patient's upper extremities to perform certain daily activities based on movements within the last week (19). The QuickDASH is a shortened version of the DASH Outcome Measure. The QuickDASH is a reliable and internally consistent tool in the measurement of RA disease activity (20). Instead of 30 items, the QuickDASH uses 11 items to measure physical function and symptoms in persons with any or multiple musculoskeletal disorders of the upper limbs. A higher score corresponds to greater disability.

The Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) was developed by Bellamy and colleagues to assess outcome in osteoarthritis (21). The WOMAC is also an appropriate measure of lower body function in RA. In addition, the WOMAC is correlated strongly with the HAQ-DI (22). This measure is a three-dimensional (i.e., pain, stiffness, physical function), self-administered health status questionnaire. In this study, we used the Likert version. Since our primary interest was examining daily functioning, we analyzed only sum scores of the 17 items reflecting daily (physical) functioning. The total score ranged from 0 (best) to 96 (worst) (23).

We used the Turkish version of the TSK to assess pain-related fear of movement (15). The TSK is a 17-item questionnaire that is aimed at the assessment of fear of (re-)injury due to movement. Each item is provided with a 4-point Likert scale; 4 corresponds to "strongly agree', and 1 corresponds to "strongly disagree." Total possible scores range from 17–68, and the total score is calculated after inverting the individual scores of items 4, 8, 12 and 16. A higher score corresponds to a high level of fear of movement. A score of 37 differentiates between high and low scores.

Statistical Analysis

We analyzed the data using IBM SPSS version 21.0 for Windows (IBM Corporation, Armonk, New York, USA). We applied post-hoc power analysis following regression analysis, and the power of the study was determined to be 99%. The age, disease duration year, TSK score, QuickDASH, HAQ-DI, and WOMAC scores were the continuous variables and presented as mean±standard deviation. We evaluated the normality of the continuous variables using the Shapiro-Wilk test and indicated that TSK score, QuickDASH, HAQ-DI, and WOMAC scores were normally distributed. We determined differences between the independent groups according to continuous variables using one-way ANOVA or student t-tests, as appropriate. We conducted the pairwise comparisons (Tukey's HSD test) after one way ANOVA. Categorical variables were compared by Chi-square test. Pearson correlation coefficient

was used to determine the relations between the TSK score and QuickDASH, HAQ-DI and WOMAC scores. A p value less than 0.05 were considered to be statistically significant.

The TSK score was considered to be dependent variable to predict the factors that effect fear of movement. Disease duration, age, QuickDASH, HAQ-DI, WOMAC pain, WOMAC stiffness and WOMAC function, and WOMAC total range (%) were used as independent variables. Based on our univariate analysis, we conducted multiple stepwise linear regression analysis to reveal the dependent variable. Independent variables which p values in univariate analysis less than 0.20 were used in the multiple stepwise linear regression analysis. We used R-square (R^2) to compare across the models and explain the total variance.

RESULTS

The disease-related characteristics of the patients are summarized in Table 1. The DAS28 score (p=0.952), gender (p=0.632) and age (p=0.099) were similar between the DMARD therapy groups (Table 1).

The combined classical DMARDs therapy group exhibited significantly better results comparing the effectiveness of DMARDs in terms of the TSK (p=0.010), QuickDASH (p=0.005), HAQ-DI (p=0.008) and WOMAC range (%) (p<0.001) (Table 1).

The significant correlations in the linear regression analysis were moderate between the TSK and age, QuickDASH, HAQ-DI, WOMAC Pain, WOMAC Stiffness, WOMAC Function, WOMAC Total and WOMAC range (%) (p<0.05). The disease duration was not correlated with TSK score (Table 2).

The multiple stepwise linear regression analysis, which is presented in Table 3, demonstrates that only QuickDASH and WOMAC Pain were significant factors on TSK score (R^2=0.293).

DISCUSSION

The results of the present study demonstrate that significant predictors of fear of movement were lower extremity pain and decreased upper extremity function in patients with RA. These findings, were consistent with studies showing that fear of movement contributes to explaining disability during the acute and chronic stages of pain. Lööf et al. (5) was the first to investigate the fear of movement levels in patients with RA and found that the patients with high fear of movement levels correlated with low level of physical activity. Although controlling pain is one indication for successful treatment, the majority of RA patients have significant amounts of pain during daily activities, which interfere them to be physically active (5,8-10). The degree of impairment in each patient can vary according to personal needs and environment. Whatever strategies

Table 1: The Disease-Related Characteristics of the Patients.

Parameters		cDMARD (n=31)	bDMARD (n=33)	Combined Therapy (n=24)	p
DAS 28	Remission-Low Disease Activity	12 (38.7%)	14 (42.4%)	10 (41.7%)	0.952
	Active Disease High Disease Activity	19 (61.3%)	19 (57.6%)	14 (58.3%)	
Gender	Female (n)	27 (87.1%)	31 (93.9%)	22 (91.7%)	0.632
	Male (n)	4 (12.9%)	2 (6.1%)	2 (8.3%)	
Age (years)		57.91±12.42	57.41±11.81	51.71±9.12	0.099
Disease Duration (years)		8.45±7.46	16.31±10.40	8.72±7.27	**0.032***
TSK (17-68)		43.31±7.22	42.21±6.01	38.11±5.71	**0.010***
QuickDASH (0-100)		46.91±24.11	45.61±19.72	28.91±20.82	**0.005***
HAQ-DI (0-3)		1.19±0.68	1.07±0.45	0.71±0.56	**0.008***
WOMAC Range (%)		47.72±25.11	38.01±19.21	22.81±20.81	**0.001***

*p<0.05. cDMARD: Classical Disease-Modifying Antirheumatic Drug; bDMARD: Biological Disease-Modifying Antirheumatic Drug; Combined Therapy: Classical Combination Disease-Modifying Antirheumatic Drug; DAS28: Disease Activity Score; TSK: Tampa Scale of Kinesiophobia; QuickDASH: The Disabilities of the Arm, Shoulder and Hand Score HAQ-DI: The Health Assessment Questionnaire Disability Index; WOMAC: The Western Ontario and McMaster Universities Osteoarthritis Index.

Table 2: Correlations between the Tampa Scale for Kinesiofobia and the Other Variables.

Variables (n=88)	Mean±SD	r	p
Age (years)	56.01±11.51	0.215	**0.044***
Disease Duration (years)	11.41±9.31	0.108	0.319
QuickDASH (0-100)	41.51±22.71	0.504	**<0.001***
HAQ-DI (0-3)	1.01±0.52	0.315	**0.003***
WOMAC Pain (0-20)	7.01±4.71	0.512	**<0.001***
WOMAC Stiffness (0-8)	2.81±2.01	0.419	**<0.001***
WOMAC Function (0-68)	26.31±16.72	0.398	**<0.001***
WOMAC Total (0-96)	36.31±22.33	0.429	**<0.001***
WOMAC Range (%)	37.21±23.72	0.419	**<0.001***

*p<0.05. QuickDASH: Disabilities of the Arm, Shoulder and Hand Score; HAQ-DI: Health Assessment Questionnaire Disability Index; WOMAC: The Western Ontario and McMaster Universities Osteoarthritis Index.

are involved, the impact of the disease in their life can be inferred from the patient-perceived difficulty in performing activities (24). Leeuw et al. (26), reported that fear of pain, fear of work-related activities, fear of movement, and fear of re-injury were described in patients who suffer from pain. RA and osteoarthritis (OA) are very frequent rheumatic diseases that compromise upper and lower extremity disability. Similarly, Güney Deniz et al. (25), also indicated that high kinesiophobia levels were affecting the early functional status in OA patients after total knee and hip arthroplasty surgery. The patients' perspectives about their fear of movement in the present study also were reflected by the high concordance among the questionnaires regarding lower extremity pain and upper extremity functional disability. We also believe that this functional disability may lead to fear of movement in daily life both as a result or as a cause of pain. Although the age, gender, and disease-activity characteristics of our DMARD therapy groups were similar, the combined classical DMARDs therapy group exhibited significantly better TSK, QuickDASH, HAQ-DI, and WOMAC (%) scores.

The regression analysis revealed that the QuickDASH and WOMAC Pain covariates explained much of the association with TSK score. We believe that it might be feasible to replace disease-related factors such as disease duration, DAS28 score, and age with simpler PROs such as QuickDASH, and WOMAC. Similarly, a longitudinal study reported that pain was the most important predictor of health-related quality of life in RA compared to joint damage, disease activity, depressive symptoms, and disability (4). The relationships were moderate to strong across all of the other PROs: QuickDASH and WOMAC sub-scores. This finding was also consistent with other studies, and supports the recommendation that measuring disability should be a part of daily clinical practice in RA (4).

Considering that the pain is one of the most common symptom in RA, our correlation results between pain and fear of movement were not surprising. The relation between pain and fear of movement that we noted was also consistent with the previously published literature (3,5,8,9). The present result of lower extremity pain and avoidance of physical activity in patients with RA can be explained by the fear avoidance. According to this model fear may lead to the avoidance of functional behaviors such

Table 3. Predictors of Fear of Movement (as measured by Tampa Scale for Kinesiophobia) in Patients with Rheumatoid Arthritis.

Variables	Unstandardized Regression Coefficient	Beta Standardized Regression Coefficient	95% Confidence Interval	t	p	F	R^2
QuickDASH	0.093	0.318	0.02–0.16	2.51	**0.013***	17.595	0.293
WOMAC Pain	0.378	0.271	0.02–0.72	2.15	**0.034***		

*p<0.05. Age, QuickDASH: The Disabilities of the Arm, Shoulder and Hand Score; WOMAC pain: Western Ontario McMaster Universities Osteoarthritis Index.

as walking which results in disability (25,26).

Previous studies have also reported low physical activity levels in patients with RA (5-7). The combination of fear of avoidance with upper extremity disability may also result in global functional disability in daily life in patients with RA (13). The severity of pain in our patients also played an important role in their disability. The ability of the patient to perform their preferred activities related to their function in daily life is an important goal of treatment. Therefore, any efforts that improve fear of movement in patients could also improve functional outcomes since the patients' opinion about their function might play a major role in their management.

Since, the TSK is an overall measure of fear of movement, it is not surprising that the factors associated with age, upper and lower extremity function, and functional disability track one another. Furthermore, the negative beliefs of patients due to lower extremity pain and fear avoidance in upper extremity activities in our study group might work in tandem to decrease physical activity. Similarly, Kinikli et al. (13), reported that lower handgrip strength and endurance were related to upper extremity functional disability which interferes performing of activities of daily living in patients with RA. The relation between physical activity and pain found in our study supports previous findings (1,3,4,6).

In the present study, upper extremity disability combined with lower extremity pain, and personal attitudes towards fear of movement might be the obstacles of the achievement of full participation in physical activity level. One potential way of increasing physical activity levels would be to provide additional allied health therapy. However, since health-service resources can be limited, efforts need to be made by physiotherapists to implement strategies to empower patients to increase physical activity levels in daily life. In our study, we demonstrated that the both QuickDASH and WOMAC Pain score were more strongly correlated with TSK score than the other PROs (7). Although the HAQ-DI is a generic measure designed to assess difficulty in performing activities of daily living in RA, it is interesting that the correlation with TSK score was lower than the WOMAC sub-scores and QuickDASH. We also observed that upper extremity disability and lower extremity pain had a greater association with fear of movement than disease duration and age. There are several limitations to this study. First of all, we did not recruit a random sample of patients with RA; we instead relied on a sample of patients who were willing to participate. Second, this study did not record all of the sociodemographic and anxiety-depression status data of the patients. The absence of social status measurements, and such as educational level, marital status and psychiatric evaluation may represents a problem since some of the associations between kinesiophobia and disease-related assessments described above might change. In the present study, fear of movement could be assessed with other valid and reliable scales like Fear Avoidance Belief Questionnaire (FABQ). However, there is still a need for measuring kinesiophobia specific to RA patients in literature. The FABQ is used to assess fear of movement for low back pain patients. The questions in the TSK were more suitable for chronic diseases like osteoarthritis and RA. Finally, the study sample was restricted to the heterogeneous nature of the patients with respect to variable drug therapies. However, this study addresses a narrower question that might constitute the basis of a future prospective, longitudinal study to identify predictors of fear of movement in RA.

In conclusion, our results indicated that it is important for health professionals to notice that upper extremity disability and lower extremity pain are influencing fear of movement in patients with RA. Therefore, health professionals may consider evaluating fear of movement and develop targeted multidisciplinary therapeutic interventions to improve health-related quality of life in patients with RA. In future studies, there is a need to fully integrate the allied health services among healthcare professionals to reduce fear of movement in patients with RA.

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Conflict of Interest: None declared.

Ethical Approval: The study was approved by An-

kara University Clinical Research Ethics Committee (06-301-17).

Informed Consent: Written informed consent was obtained from all study participants.

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REFERENCES

1. Garip Y, Eser F, Bodur H. Comorbidities in Turkish patients with rheumatoid arthritis: association with the health-related quality of life in terms of disease activity, functional and radiological status, severity of pain, and social and emotional functioning. Acta Reumatol Port. 2016;41(4):344-9.
2. Wan SW, He H-G, Mak A, Lahiri M, Luo N, Cheung PP, et al. Health-related quality of life and its predictors among patients with rheumatoid arthritis. Appl Nurs Res. 2016;30:176-83.
3. Nicassio PM, Kay MA, Custodio MK, Irwin MR, Olmstead R, Weisman MH. An evaluation of a biopsychosocial framework for health-related quality of life and disability in rheumatoid arthritis. J Psychosom Res. 2011;71(2):79-85.
4. Rupp I, Boshuizen H, Dinant H, Jacobi C, Van den Bos G. Disability and health-related quality of life among patients with rheumatoid arthritis: association with radiographic joint damage, disease activity, pain, and depressive symptoms. Scand J Rheumatol. 2006;35(3):175-81.
5. Lööf H, Demmelmaier I, Welin Henriksson E, Lindblad S, Nordgren B, Opava C, et al. Fear-avoidance beliefs of physical activity in adults with rheumatoid arthritis. Scand J Rheumatol. 2015;44(2):93-9.
6. Eurenius E, Stenström CH. Physical activity, physical fitness, and general health perception among individuals with rheumatoid arthritis. Arthritis Rheum. 2005;53(1):48-55.
7. Stenström CH, Minor MA. Evidence for the benefit of aerobic and strengthening exercise in rheumatoid arthritis. Arthritis Rheum. 2003;49(3):428-34.
8. Courvoisier DS, Agoritsas T, Glauser J, Michaud K, Wolfe F, Cantoni E, et al. Pain as an important predictor of psychosocial health in patients with rheumatoid arthritis. Arthritis Care Res. 2012;64(2):190-6.
9. Karimi S, Yarmohammadian MH, Shokri A, Mottaghi P, Qolipour K, Kordi A, et al. Predictors and effective factors on quality of life among Iranian patients with rheumatoid arthritis. Mater Sociomed. 2013;25(3):158-62.
10. Groessl EJ, Ganiats TG, Sarkin AJ. Sociodemographic differences in quality of life in rheumatoid arthritis. Pharmacoeconomics. 2006;24(2):109-21.
11. Matcham F, Scott IC, Rayner L, Hotopf M, Kingsley GH, Norton S, et al. The impact of rheumatoid arthritis on quality-of-life assessed using the SF-36: a systematic review and meta-analysis. Semin Arthritis Rheum. 2014;44(2):123-30.
12. Sánchez-Herán Á, Agudo-Carmona D, Ferrer-Peña R, López-de-Uralde-Villanueva I, Gil-Martínez A, Paris-Alemany A, et al. Postural stability in osteoarthritis of the knee and hip: analysis of association with pain catastrophizing and fear-avoidance beliefs. PM&R. 2016; 8(7):618-28.
13. Kinikli GI, Sahin A, Guney H, Yuksel I, Kinikli G. Investigation of grip strength and upper extremity functional disability in patients with rheumatoid arthritis. J Exerc Ther Rehabil. 2016;3(2):60-5.
14. Hart HF, Collins NJ, Ackland DC, Crossley KM. Is impaired knee confidence related to worse kinesiophobia, symptoms, and physical function in people with knee osteoarthritis after anterior cruciate ligament reconstruction? J Sci Med Sport. 2015;18(5):512-7.
15. Yilmaz OT, Yakut Y, Uygur F, Ulug N. Turkish Version of the Tampa Scale for Kinesiophobia and its test-retest reliability. Turk J Physiother Rehabil.2011;22(1):44-9.
16. Arnett FC, Edworthy SM, Bloch DA, McShane DJ, Fries JF, Cooper NS, et al. The American Rheumatism Association 1987 revised criteria for the classification of rheumatoid arthritis. Arthritis Rheum. 1988;31(3):315-24.
17. Prevoo M, Van't Hof M, Kuper H, Van Leeuwen M, Van De Putte L, Van Riel P. Modified disease activity scores that include twenty-eight joint counts development and validation in a prospective longitudinal study of patients with rheumatoid arthritis. Arthritis Rheum. 1995;38(1):44-8.
18. Küçükdeveci AA, Sahin H, Ataman S, Griffiths B, Tennant A. Issues in cross-cultural validity: Example from the adaptation, reliability, and validity testing of a Turkish version of the Stanford Health Assessment Questionnaire. Arthritis Rheum. 2004;51(1):14-9.
19. Düger T, Yakut E, Öksüz Ç, Yörükan S, Bilgütay B, Ayhan Ç. Reliability and validity of the Turkish version of the Disabilities of the Arm. Shoulder and Hand (DASH) Questionnaire. Turk J Physiother Rehabil. 2006;17(3):99-107.
20. Craig C, Carroll M. Validation of the Quickdash in the Assessment of Rheumatoid Arthritis Disease Activity. Arthritis Rheum. 2015; 67(suppl 10).
21. Bellamy N, Buchanan WW, Goldsmith CH, Campbell J, Stitt LW. Validation study of WOMAC: a health status instrument for measuring clinioally important patient relevant outcomes to antirheumatic drug therapy in patients with osteoarthritis of the hip or knee. J Rheumatol. 1988;15(12):1833-40.
22. Wolfe F. Determinants of WOMAC function, pain and stiffness scores: evidence for the role of low back pain, symptom counts, fatigue and depression in osteoarthritis, rheumatoid arthritis and fibromyalgia. Rheumatology (Oxford). 1999;38(4):355-61.
23. Tüzün E, Eker L, Aytar A, Daşkapan A, Bayramoğlu M. Acceptability, reliability, validity and responsiveness of the Turkish version of WOMAC osteoarthritis index. Osteoarthritis Cartilage. 2005;13(1):28-33.
24. Chopra A, Saluja M, Patil P, Tandale H. Pain and disability, perceptions and beliefs of a rural Indian population: a WHO-ILAR COPCORD study. WHO-International league of associations for rheumatology. community oriented program for control of rheumatic diseases. J Rheumatol. 2002; 29(3):614–21.
25. Güney-Deniz H, Kınıklı GI, Çağlar Ö, Atilla B, Yüksel İ. Does kinesiophobia affect the early functional outcomes following total knee arthroplasty? Physiother Theory Pract. 2017;33(6):448-53.
26. Leeuw M, Goossens ME, Linton SJ, Crombez G, Boersma K, Vlaeyen JW. The fear-avoidance model of musculoskeletal pain: current state of scientific evidence. J Behav Med. 2007;30(1):77–94.