Impaired Balance and Fall Risk in Rheumatoid Arthritis Patients

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Abstract

Objective: This study evaluated the history of falling, fear of falling and fall risk in patients with rheumatoid arthritis (RA) and investigated the relationship of these with functional status, balance, disability, walking speed, and disease activity.

Material and Methods: Sixty-five patients with RA and 43 healthy volunteers were included in the study. Their fall history within the last year was questioned. The Steinbrocker functional class system was used to identify the patients. The fear of falling was assessed using the Tinetti Falls Efficacy Scale (Tinetti FES). The Tinetti Balance and Gait Tests, Berg Balance Scale, 10-Meter Walk Test, Timed Up and Go Test, One-Leg Stand Test, and Functional Reach Test were performed. Disability was evaluated in the health assessment questionnaire (HAQ).

Results: Twenty-eight subjects in the patient group reported one or more falls within the last year. These subjects were older and had longer RA disease duration, greater fear of falling, higher HAQ scores, and functional class. According to the Tinetti total score, 28 (43.1%) patients had a low-fall risk, 22 (33.8%) had a medium-fall risk, and 15 (23.1%) had a high-fall risk.

Conclusion: The most important factors related to fall risk were the Steinbrocker Functional Class and the Tinetti FES score.

Keywords: Rheumatoid arthritis, impaired balance, fall risk

Introduction

Rheumatoid arthritis (RA) is a disease with a varying clinical course. RA is characterized by immune-mediated chronic inflammation, and genetic susceptibility is believed to play an important role in its occurrence. The regions mainly affected are the synovium, bursa, and tendon sheaths of the joints. Because of synovitis, erosion occurs in the articular cartilage and in the bone tissue adjacent to the cartilage, and damage develops in the joint. Extra-articular findings of the disease are frequently encountered, and the disease can sometimes have a very serious course (1,2).

The fear of falling is a risk factor for fall among the elderly people, and it has been reported that musculoskeletal disorders such as muscle weakness, arthritis, joint pain, and deformities also increase the risk of fall (3,4). In individuals with arthritis, particularly in postmenopausal women with osteoporosis, falls pose a great danger for mortality and morbidity (3).

In patients with RA, postural control problems can lead to impaired balance during daily life activities such as walking and climbing stairs (4,5) because joint pain destruction, muscle weakness, contractures, imbalance in weight bearing; thus, increased postural release can increase fall risk in these patients (4–6). Although more than half of these patients specify that the fear of falling is a factor restricting their physical activities, there are a few studies on impaired balance and fall in patients with RA in literature (7–9).

The aim of this study is to investigate the history, fear, and risk of falling in patients with RA and to determine the relation-

ships of these factors with functional state, balance, walking speed, disability, and disease activity.

Material and Methods

This study included 65 patients with RA who presented to Ankara Physical Medicine and Rehabilitation Hospital and were diagnosed with RA according to the diagnostic criteria of the American Rheumatism Association; 43 healthy volunteers were included as controls. Ethical approval was obtained from the ethics committee of Ankara Physical Medicine and Rehabilitation Hospital before study initiation. Moreover, the study and control groups were informed about the study in detail, and written informed consents were obtained from them.

Individuals with a history of a neurological disease, severe hearing and visual defects, severe pulmonary disease, uncontrolled hypertension and cardiac disease, chronic liver and kidney failure, malignancy, major psychiatric disorder, and a previous joint surgery were excluded from the study.

All cases were questioned regarding their ages, genders, use of any drug, fall history, use of an accessory device, history of a previous arthroplasty surgery, RA-related symptoms, and disease duration. General physical examination and locomotor system examination were performed for all cases. Furthermore, C-reactive protein (CRP) levels and erythrocyte sedimentation rate (ESR) were evaluated. Functional evaluation of the patient group was carried out by the Steinbrocker functional classification (10,11).

The disease activity of RA was evaluated through the disease activity score (DAS28) (12). Functional disability of patients was evaluated by the health assessment questionnaire (HAQ) (13). For evaluating patients' quality of life, short form-12 (The Medical Outcomes Study 12-Item Short Form Health Survey) (SF-12) was used (14,15). In addition, arthritis-related health states of patients were evaluated using the arthritis impact measurement scale (AIMS-2-SF) (16, 17). To assess the balance of patients, Berg balance scale (BBS), Tinetti Balance and Gait Test, One-leg Stand Test (OLS), Timed Up and Go Test (TUG), and 10-m Walk Test were utilized. The fear of falling was evaluated by Tinetti's Falls Efficacy Scale (Tinetti FES).

Berg Balance Scale is a Clinical Scale that is used for measuring functional balance abilities, and it evaluates 14 activities that are routinely performed in daily life (18,19).

One-leg Stand Test is a balance test that is commonly used for evaluating postural stability (19).

In Tinetti's Balance and Gait Test, balance and gait are evaluated in two separate parts. Low scores show impaired balance and gait disorder (20).

Timed Up and Go Test measures the speed during many functional maneuvers such as standing up, walking, turning, and sitting. A statistically significant relationship between TUG time and fall risk has been demonstrated in literature (21).

With 10-m walk test, the time and speed of patient's walking 10 m were assessed (22).

Functional Reach Test was Employed for the evaluation of anteroposterior stability (23).

Tinetti FES is a scale with 10 items. Participants rate each item with a score ranging from 0 (not safe) to 10 (very safe).

When all scores are added, a total score varying between 0 (low efficacy related to falling) and 100 (high efficacy related to falling) is obtained (24).

Statistical Analysis

The data obtained were analyzed using SPSS for Windows 11.5 (Statistical Package for the Social Sciences IBM, Chicago, IL, USA). Normality of the distribution of continuous variables was examined through the Shapiro–Wilk test. For the demonstration of descriptive statistics, mean ± standard deviation, median (minimum–maximum), or median (interquartile range) were used for continuous variables, whereas and the number and percentage (%) of patients were used for categorical variables.

The significance levels of difference in terms of mean values and in terms of median values between the groups were investigated with Student's t-test and Mann–Whitney U test, respectively. Categorical variables were analyzed with Pearson's Chi-square test and Fisher's exact Chi-square test. Spearman's correlation test was used for detecting whether there was a significant correlation between continuous variables.

For detecting the most determinative risk factors for falling in the patient group, retrospective and multivariate logistic regression analysis was used. The variables with the values of $p<0.25$, which were found as a result of univariate statistical analyses, were included in the multivariate logistic regression model as candidate risk factors. Odds ratio, 95% confidence interval, and Wald statistics were calculated for each variable.

The value of $p<0.05$ was accepted to be statistically significant.

Results

The study included 65 patients with the diagnosis of RA and 43 healthy controls. The patient group consisted of 55 female (84.6%) and 10 male (15.4%) patients. The control group included 37 female (86%) and 6 male (14%) volunteers. The mean age was 55.6±11.5 years for the patient group and 53.5±7.6 years for the control group. There was no statistically significant difference between both the groups with regard to gender and age ($p>0.05$).

Demographic features of the patient and control groups and disease duration, disease activity, functional stage, AIMS score, and descriptive statistics for fall risk in the patient group are presented in Tables 1 and 2.

Twelve of the patients (18.5%) and seven of the controls (16.3%) had a history of previous lower extremity joint replacement. No statistically significant difference was found between two groups in terms of surgical history ($p>0.05$).

The descriptive statistics for the scores of balance tests, HAQ, SF-12, and Tinetti FES in the patient and control groups are given in Table 3.

The patient group was divided into two groups considering the fall history within the last 1 year. The rate of fall history was detected to be statistically significantly higher in female patients ($p=0.034$). There was a significant difference between the groups with and without fall history in terms of age ($p=0.002$), and it was observed that the rate of fall history increased with

Table 1. Demographic features of patients according to the control and patient groups

Variables	Patient group (n=65)	Control group (n=43)	p value
Age, years	55.6±11.5	53.5±7.6	0.249
Gender			0.838
Female	55 (84.6%)	37 (86.0%)	
Male	10 (15.4%)	6 (14.0%)	
BMI, kg/m^2	30.0±4.1	30.7±4.2	0.443
BMI classification			0.196
Normal weight	7 (10.8%)	1 (2.3%)	
Overweight	20 (30.8%)	16 (37.2%)	
Obese	38 (58.5%)	26 (60.5%)	

BMI: body mass index

Table 2. Demographic features of patients according to the control and patient groups

Variables	Patient group (n=65)	Control group (n=43)	p value
Presence of a surgical history	12 (18.5%)	7 (16.3%)	0.771**
Disease duration	120 (12–504)		
Steinbrocker functional stage	2 (1–4)		
DAS 28	4.1 ± 1.1		
Disease activity			
Remission	5 (7.7%)		
Low	7 (10.8%)		
Medium	46 (70.8%)		
High	7 (10.8%)		
AIMS physical	4.0 (1.8)		
AIMS symptom	4.2 (3.3)		
AIMS affect	6.0 (2.5)		
AIMS social	3.7 (2.2)		
Tinetti total fall risk			
High	15 (23.1%)		
Medium	22 (33.8%)		
Low	28 (43.1%)		

AIMS: arthritis impact measurement scale; DAS28: disease activity score

age. In the patient group, no statistically significant relationship was observed between the occurrence of falls and body mass index (BMI; p>0.05). There was a statistically significant relationship between falling and the history of previous surgery in the patient group (p=0.013), and patients with a history of surgery were exposed to fall risk more often. In the participants with fall history in the patient group, a statistically significant relationship was observed between functional stage and disease duration (p<0.001 and p=0.029). Disease duration was significantly longer and functional stage was more advanced in patients having a fall history (Table 4).

Considering the distribution of patients with and without a fall history according to the drugs that they used, it was found that fall risk was significantly higher only in patients using antidepressant and antiepileptic drugs (p=0.017).

In individuals with a fall history in the patient group, BBS score, OLS test, TUG test, Tinetti Balance and Gait Test Scores, and 10-m walk test results were different; the differences were statistically significant. No statistically significant relationship was detected between functional reach test result and fall history (p=0.085; Table 5).

In the patient group, HAQ score, SF-12 physical score, Tinetti FES, DAS28, and AIMS physical and symptom scores were found to be significantly different in patients with a fall history compared with those without a fall history. In contrast, no statistically significant relationship was detected between SF-12 mental score and AIMS affect and social scores and fall history (Table 5).

Correlation Analyses

With regard to the relationship of Tinetti FES, HAQ, and SF-12 scores with each other and with other clinical measurements, a negative relationship was found between Tinetti FES score and HAQ; AIMS physical, symptom, and social component scores; functional stage; TUG test results; and 10-m walk test results. In contrast, a positive relationship was observed between Tinetti FES and SF-12 physical and mental component scores, Tinetti

Balance and Gait Test results, BBS score, OLS, and Functional Reach Test results (p<0.05). There was no statistically significant relationship between Tinetti FES and AIMS affect score (p>0.05; Table 6).

A negative relationship was found between HAQ score and Tinetti FES, SF-12, Tinetti Balance and Gait Test results, BBS, OLS, and Functional Reach Test Results. There was a positive relationship between HAQ and AIMS physical, symptom, affect, and social component scores; functional stage; TUG test results, and 10-m walk test results (p<0.05); a negative relationship between SF-12 physical component scores and HAQ; AIMS physical, symptom, and social scores; functional stage; TUG test results; and 10-m walk test results (p<0.05; Table 6).

A positive relationship was revealed between SF-12 physical component score and Tinetti FES, Tinetti Balance and Gait Test, BBS, OLS, and Functional Reach Test Results (p<0.05). Although no relationship was detected between SF-12 physical component score and AIMS affect score (p>0.05), there was a negative relationship between SF-12 mental component scores and HAQ; AIMS physical, symptom, affect, and social component scores; functional stage; TUG test results, and 10-m walk test results (Table 6).

Furthermore, there was a positive relationship between SF-12 mental component score and Tinetti FES, Tinetti Balance and Gait Test results, BBS, and OLS (p<0.05), but no relationship was seen between functional reach test results and Tinetti Balance and Gait Test results (p>0.05; Table 6).

Table 3. Clinical measurements of patients in the control and patient groups

Variables	Patient group (n=65)	Control group (n=43)	p value
BBS	49.0 (13.0)	55.0 (2.0)	<0.001
OLS (s)	10.5 (18.4)	40.0 (41.2)	<0.001
TUG (s)	12.0 (6.9)	8.4 (1.9)	<0.001
10-m walking time (s)	10.6 (4.7)	8.1 (1.3)	<0.001
Tinetti walk	10.0 (2.5)	12.0 (1.0)	<0.001
Tinetti balance	12.0 (3.0)	15.0 (1.0)	<0.001
Tinetti total	22.0 (6.0)	27.0 (2.0)	<0.001
Functional reach test (cm)	18.1 ± 6.3	22.0 ± 5.9	0.002
Tinetti FES	86.0 (45.5)	100.0 (3.0)	<0.001
HAQ	1.63 (1.06)	0.38 (0.37)	<0.001
SF-12 physical	33.6 ± 9.8	54.0 ± 6.8	<0.001
SF-12 mental	39.1 ± 10.4	41.2 ± 9.7	0.307

BBS: Berg balance scale; HAQ: health assessment questionnaire; OLS: one-leg stand test; SF-12: short form-12; Tinetti FES: Tinnetti's falls efficacy scale; TUG: timed up and go test

Table 4. Demographic features of cases with and without fall history in the patient group

Variables	No fall (n=37)	Fall available (n=28)	p value
Age, years	51.9±11.1	60.5±10.4	0.002
Gender			0.034
Female	28 (75.7%)	27 (96.4%)	
Male	9 (24.3%)	1 (3.6%)	
BMI, kg/m²	29.3±4.3	31.0±3.7	0.117
BMI classification			0.172
Normal weight	6 (16.2%)	1 (3.6%)	
Overweight	12 (32.4%)	8 (28.6%)	
Obese	19 (51.4%)	19 (67.9%)	
Disease duration	72 (12–264)	144 (12–504)	0.029
Steinbrocker functional stage	2 (1–3)	3 (2–4)	<0.001
Disease activity			
Remission	5 (13.5%)	—	0.065
Low	6 (16.2%)	1 (3.6%)	0.130
Moderate	24 (64.9%)	22 (78.6%)	0.229
High	2 (5.4%)	5 (17.9%)	0.224
Surgical history	3 (8.1%)	9 (32.1%)	0.013
Use of antidepressant and antiepileptic drugs	1 (2.7%)	7 (25.0%)	0.017

BMI: body mass index

Table 5. Other clinical measurements of cases with and without fall history in the patient group

Variables	Patient group (n=65)	Control group (n=43)	p value
BBS	53.0 (4.0)	42.0 (6.5)	<0.001
OLS	12.8 (20.4)	5.9 (8.0)	<0.001
TUG	10.4 (3.7)	16.6 (8.6)	<0.001
10-m walking time	8.9 (2.5)	13.3 (5.5)	<0.001
Tinetti walk	11.0 (1.0)	9.0 (2.0)	<0.001
Tinetti balance	14.0 (2.5)	11.0 (2.0)	<0.001
Tinetti total	25.0 (2.5)	18.5 (3.7)	<0.001
Tinetti total fall risk			
High	1 (2.7%)	14 (50.0%)	<0.001
Moderate	9 (24.3%)	13 (46.4%)	0.062
Low	27 (73.0%)	1 (3.6%)	<0.001
Functional Reach Test	19.3±5.5	16.6±6.9	0.085
HAQ	1.2 (0.7)	2.1 (0.5)	<0.001
SF-12 physical	38.3±9.5	27.5±6.2	<0.001
SF-12 mental	40.8±10.6	37.0±10.1	0.144
Tinnetti FES	100.0 (8.5)	52.5 (33.7)	<0.001
DAS28	3.7±1.1	4.6±0.8	<0.001
AIMS physical	3.3 (1.7)	4.8 (2.0)	<0.001
AIMS symptom	3.3 (2.5)	5.8 (3.3)	<0.001
AIMS affect	6.0 (2.5)	6.0 (2.9)	0.728
AIMS social	4.4 (2.5)	3.7 (2.5)	0.276

AIMS: arthritis impact measurement scale; BBS: Berg balance scale; DAS28: disease activity score; HAQ: health assessment questionnaire; OLS: one-leg stand test; SF-12: short form-12; Tinetti FES: Tinnetti's falls efficacy scale; TUG: timed up and go test

Regression Analyses

The most determinative risk factors that may be effective on fall were found to be Steinbrocker functional stage and Tinetti FES score. As the disease stage advanced and Tinetti FES score decreased, fall risk increased; this trend was statistically significant. One-stage increase in the disease stage elevated fall risk 9.89 times (95% confidence interval: 1.96–49.95; p=0.006) and a 10-unit decrease in Tinetti FES score increased fall risk 1.94 times (95% confidence interval: 1.19–3.14; p=0.008).

Discussion

The fear and risk of falling are important problems in patients with RA as well as in older individuals. In patients having arthritis, biomechanical abilities and exercise tolerance are decreased (25). It has been reported that RA has a negative effect on postural stability (4,6). It has also been stated in the studies that lower extremity problems developing in patients with RA decrease strength and proprioception, and they impair mobility and postural stability. Thus, they cause an increased risk of falling (8).

Table 6. Correlation coefficients of FES, HAQ, and SF-12 scores with each other and with other clinical measurements in the patient group

	FES		HAQ		SF-12 PCS		SF-12 MCS	
	r	p	r	P	r	p	r	p
Tinetti balance	0.725	<0.001	-0.749	<0.001	0.704	<0.001	0.343	0.005
Tinetti walk	0.734	<0.001	-0.684	<0.001	0.591	<0.001	0.201	0.109
Tinetti total	0.773	<0.001	-0.750	<0.001	0.709	<0.001	0.312	0.011
BBS	0.737	<0.001	-0.754	<0.001	0.614	<0.001	0.272	0.028
OLS	0.519	<0.001	-0.530	<0.001	0.391	<0.001	0.331	0.007
TUG	-0.675	<0.001	0.731	<0.001	-0.603	<0.001	-0.316	0.010
10-m walk test	-0.696	<0.001	0.761	<0.001	-0.655	<0.001	-0.331	0.007
Functional reach test	0.370	0.002	-0.370	0.002	0.357	0.004	0.103	0.414
Tinetti FES	1.000	.	-0.750	<0.001	0.655	<0.001	0.386	<0.001
HAQ	-0.750	<0.001	1.000	.	-0.777	<0.001	-0.365	0.003
SF-12 PCS	0.655	<0.001	-0.777	<0.001	1.000	.	0.269	0.030
SF-12 MCS	0.386	<0.001	-0.365	0.003	0.269	0.030	1.000	.
AIMS physical	-0.596	<0.001	0.726	<0.001	-0.588	<0.001	-0.458	<0.001
AIMS symptom	-0.307	0.013	0.519	<0.001	-0.438	<0.001	-0.411	<0.001
AIMS affect	-0.125	0.320	0.341	0.005	-0.202	0.107	-0.614	<0.001
AIMS social	-0.264	0.033	0.275	0.027	-0.320	0.009	-0.380	0.002
Steinbrocker functional stage	-0.768	<0.001	0.850	<0.001	-0.748	<0.001	-0.414	<0.001

AIMS: arthritis impact measurement scale; BBS: Berg balance scale; Tinetti FES: Tinnetti's falls efficacy scale; HAQ: health assessment questionnaire; OLS: one-leg stand test; SF-12: short form-12; TUG: timed Up and go test

Our study investigated history, fear, and risk of falling in patients with RA and their relationship with functional state, balance, walking speed, disability, and disease activity. Our results showed that the most determinative risk factors that may have an effect on fall risk were Steinbrocker functional stage and Tinetti FES score.

In our study, 43.1% of patients with RA had a fall history within the last 1 year, and this rate was similar to the rates found in other studies in literature. In the study of Jamison et al. (8), 60% of patients with RA had the fear of falling and 35% of these patients had a fall history within the last 1 year. In the study of Armstrong et al. (26) conducted on 253 patients with RA, the rate of falling at least for once in the last 1 year was found to be 33%. In the 1-year prospective study performed by Hayashibara et al. (27), the incidence of falling in female patients with RA was 50%. Moreover, Fessel and Nevitt (28) reported the rate of falling in the last 1 year as 30% in 570 patients with RA who were at the age of 50 years and above.

In our study, gender was a risk factor for fall in the patient group, and the rate of the fall history was significantly higher in females than in males. In literature, in a study conducted by Tinetti et al. (29) on 1,103 patients aged >72 years, the risk of falling was detected to be higher in females than in males. Ekdahl (30) mentioned that age and gender were important factors that affect postural control. However, contrary to our study, postural release and fall risk were higher in males than in females in the second study.

In our study, the mean age was higher in patients with a fall history than in patients without a fall history, and this difference was statistically significant. In the studies conducted on the elderly population, age was determined as one of important risk factors for fall (31,32). Trappe et al. (33) compared quadriceps muscle volume in young and old patients by magnetic resonance imaging; they reported that muscle strength was associated with muscle volume, and muscle volume decreased with increasing age.

In the study of Aydoğ et al. (4), dynamic balance was demonstrated to be impaired in patients with RA, and age and BMI were detected to be important factors affecting postural dynamic balance. In addition, Furuya et al. (34) found a positive relationship between high BMI and fall risk. In our study, there was no statistically significant relationship between the fall history and BMI. Similarly, Oswald et al. (35) found no relationship between BMI and fall in their study conducted on patients with inflammatory polyarthritis.

Automatic postural responses operate to keep the center of gravity over the base of support. In patients having the disease for a long time, particularly deformities in the joints of the lower extremities can lead to impaired postural responses (36,37). Patients not treated properly can become disabled in 10 years (38). Foot deformities are encountered in 90% of patients having a long disease duration of RA (39). In the study of Mann and Horton (40), although foot and ankle symptoms were observed in 55% of patients with RA lasting for <10 years, this rate increased to 76% in patients with a 20-year disease duration. In

another study, disease duration was found to be considerably longer, and the rates of disease activity and functional disability were found to be higher in patients with hip involvement (41).

In the studies performed by Jamison and Furuya, the durations of disease were detected to be longer in patients with RA having a history and fear of falling (8,34). In contrast, in the study of Kaz Kaz et al. (7), no relationship was found between disease duration and fall risk. In our study, disease duration was longer, and functional stage was more advanced in patients with a fall history.

Compared with the control group, functional disability was increased, fear and risk of falling were increased, and life quality was decreased in patients.

According to the total score of Tinetti test, the rate of fall risk was high in 23.1% patients, moderate in 33.8% patients, and low in 43.1% patients.

In the study conducted by Çakıt et al. (42), 60.7% of patients with RA had moderate or high risk of falling. In this study, balance and disability scores were the most determining risk factors for the fear and risk of falling; in addition, walking speed was lower and HAQ score was higher in patients with RA than in the control group.

In our study, the duration of standing on one leg, TUG test time, and 10-m walking time were found to be higher; Tinetti total score, BBS score, and SF-12 physical score were lower; and AIMS physical and symptom scores were higher in the patients with a fall history. Compared with patients without a fall history, patients having a fall history had higher disease activity and functional disability as well as significantly more Impairment in Balance Tests.

For evaluating the fear of falling in our patients, falls efficacy scale (FES), which was developed by Tinetti et al. (29) in 1990, was used. In the evaluation of Tinetti FES values in patients with and without fall history, the values were found to be lower in the group with a fall history; this suggests that a higher level of the fear of falling is expected in these patients.

In our study, 10-m walking time and TUG test time were longer, functional reach distance was shorter, OLS time was shorter, Tinetti Balance and Gait Test Scores were lower, and BBS score was lower in patients with higher fear of falling. For these patients, functional stages were more advanced, functional disabilities were increased, and life quality was decreased. They were more affected physically and socially because of chronic arthritis. These patients restrict their activities because of the fear of falling and go into depression more frequently. Because the only known and preventable risk factor for the fear of falling is a fall history, the precautions to be taken for the prevention of falls are highly important for decreasing the fear of falling (43). With the prevention of falls or the decrease in their frequency, the problems faced by patients because of their fear can be avoided.

OLS test is a balance test that is commonly and easily used in the evaluation of postural stability. We think that it is a test that can be performed under the conditions of outpatient clinic for assessing fall risk in patients with RA.

TUG and Functional Reach Tests are also easy and inexpensive tests that can be applied under the conditions of outpatient clinic in a short time. They provide us to evaluate fall risk and impaired balance in patients with RA easily. TUG test can also indicate balance as well as the performance during activities such as standing, walking, turning, and sitting, which are frequently performed in daily life.

In the study of Smulders et al. (44), compared with healthy controls, the self-confidence of patients with RA during daily activities was found to be decreased and the fear of falling was increased. Fessel and Nevitt (9) demonstrated the relationship between the fear of falling and female gender, decreased physical function, the number of painful joints, and depressive symptoms in patients with RA.

In our study, AIMS physical and symptom scores and DAS28 levels were higher in patients with a fall history. High disease activity was also associated with fall risk. Increased inflammation can affect the proprioceptive impulses coming from the joints of the lower extremities and can cause decreased postural control. The control of disease activity is important for decreasing fall risk and thus preventing fractures. Similar to our study, Furuya et al. (34) found the number of tender joints, DAS28 scores, and HAQ scores were higher in patients with a fall history. In contrast, in the study of Tjon et al. (5), disease activity was not reported to be an important parameter for balance problems in patients with RA. Moreover, in the study of Aydoğ et al. (4), no relationship was observed between balance and disease duration, disease activity, CRP level, and DAS28 in patients with RA.

In our study, it was revealed that HAQ score was higher in patients with a fall history. In these patients with high scores of HAQ, Tinetti balance and gait test results and BBS scores were lower, OLS time and functional reach distance were shorter, and 10-m walking time and TUG test time were longer. HAQ scores were found to be higher in patients with more advanced disease stage and with higher impact of chronic arthritis. In patients with more functional disabilities, the fear level of falling was higher, and life quality level was decreased. Moreover, high HAQ score was associated with an increased fall risk.

In the study of Armstrong et al. (26), physical activity was detected to be considerably higher in patients with a fall history. Luoto et al. (45) observed a clear relationship between high HAQ score and poor performance in the OLS and TUG tests. Therefore, we suggest that HAQ score can be an easy tool for evaluating fall risk in patients with RA.

In our study, there was a statistically significant positive relationship between fall and surgical history in the patient group, and patients with a history of previous joint replacement surgery had higher fall risk. Joint replacement surgery can cause impaired load distribution in the joint and balance loss.

Furuya et al. (34) found that the number of patients who underwent knee and hip arthroplasty among the ones with a fall history was higher. Levinger et al. (46) evaluated preoperative and postoperative risks of falling to be increased in patients having undergone knee joint replacement. In addition, although the proprioceptive deficits in the joint and balance disorders were found after arthroplasty and it was specified that fall risk could increase in some studies (47,48), other studies revealed decreased joint pain and improved function and proprioception after total knee arthroplasty (49,50).

In the study of Sturnieks (3), it was reported that there was an impairment in muscle strength, proprioceptive acuity, and standing balance as well as an increase in fall risk in the elderly patients with arthritis in the lower extremity joints. It was stated that the strategies to be applied for improving muscle strength and developing proprioceptive acuity would help balance to improve and falls to be prevented.

In our study, the patients with and without fall history were evaluated in terms of the drugs that they used; it was found that fall risk was significantly higher only in patients using antidepressant and antiepileptic drugs. In a literature review, antidepressants, sedatives, psychotropics, digoxin, and antiarrhythmics were reported to be associated with fall risk (51,52). In the study of Carbone et al. (53) on postmenopausal women, patients using antiepileptic drugs had increased fall and fracture risk. In the study conducted by Gribbin et al. (54), it was reported that the use of selective serotonin noradrenaline reuptake inhibitor (SSRI) led to increased fall risk in old patients, and this result was similar to the result in the use of tricyclic antidepressants and SSRIs. Patients in our study used antiepileptic drugs for neuropathic pain treatment. Correct determination of indication for the use of drug, warning patients about side effects, and avoiding from the use of multiple drugs can decrease the risk of falling. High level of anxiety can be associated with decreased postural control and impaired balance during walking. In our study, no evaluation method was used for measuring the depression and anxiety levels of our patients. In further studies, the use of scales measuring the levels of depression and anxiety can be useful. In addition, the psychological evaluation of patients during rehabilitation program can improve treatment efficiency.

Conclusion

Fall risk and the fear of falling are important health problems in patients with RA. Knowing risk factors related to the fear of falling can be useful for decreasing this fear and for improving life quality. The development of successful postural control rehabilitation methods in addition to drug therapy can provide improvement in the functional states of patients with RA, decrease in fall risk, and continuance of abilities in work environment. Moreover, the evaluation of drugs used by patients is also important for decreasing fall risk.

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