

Investigation of Body Compositions and Dietary Habits of Patients with Rheumatoid Arthritis: A Case Control Study

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ABSTRACT

Aim: The aim of this study was to investigate the body composition and dietary habits of patients with Rheumatoid Arthritis (RA) and to compare them with healthy controls.

Material and Methods: 64 participants (RA n=32 and mean age: 55.2±1.5 years; Healthy Group n=32 and mean age: 54.5±1.5 years) were included in the study. Body compositions (body mass index, body fat ratio, skeletal muscle mass, skeletal muscle mass index) were evaluated with the body analysis system device (Polosmart PSC12 Prolife) and dietary habits (meat/fish consumption, legumes consumption, egg consumption, milk/dairy product consumption and liquid consumption) were evaluated with questions created by the researchers. In the comparison of independent group differences, the Independent Samples T Test was used when the parametric test assumptions were met, and the Mann Whitney U test was used when the parametric test assumptions were not met..

Results: When comparing body compositions, there was a significant difference in skeletal muscle mass (p=0.001) and skeletal muscle mass index (p=0.002) in favor of the healthy group; but body mass index and body fat ratios were similar (p>0.05). When comparing the dietary habits, milk/dairy product (p=0.008), meat/fish (p=0.001), legumes (p=0.001) and liquid (p=0.046) consumptions were higher in healthy group; but egg consumption was similar (p>0.05)

Conclusion: The patients with RA had less muscle mass, lower skeletal muscle mass index scores, and worse nutritional levels compared to healthy controls. In the light of these results, we recommend that patients with RA receive support from professional centers regulating dietary habits, as well as exercise methods that increase muscle mass.

Keywords: Rheumatoid arthritis, Body composition, Dietary habits

Romatoid Artrit'li Bireylerin Vücut Kompozisyonlarının ve Beslenme Alışkanlıklarının İncelenmesi: Karşılaştırmalı Bir Çalışma

ÖZ

Amaç: Bu çalışmanın amacı Romatoid Artrit'li (RA) bireylerin vücut kompozisyonlarını ve beslenme alışkanlıklarını araştırmak ve sağlıklı bireylerle karşılaştırmaktır.

Gereç ve Yöntemler: Çalışmaya 64 birey (RA n: 32 ve ort. yaş: 55,18±1,52 yıl; Sağlıklı Grup n: 32 ve ort. yaş: 54,50±1,54 yıl) dahil edildi. Vücut kompozisyonları (vücut kütle indeksi, vücut yağ oranı, iskelet kası kütlesi, iskelet kas kütlesi indeksi) vücut analiz sistemi cihazı (Polosmart PSC12 Prolife) ile, beslenme alışkanlıkları (et/balık tüketimi, kurubaklagil tüketimi, yumurta tüketimi, süt/süt ürünü tüketimi, sıvı tüketimi) çalışmacılar tarafından oluşturulan sorular ile değerlendirildi. Bağımsız grup farklarının karşılaştırılmasında, parametrik test varsayımları karşılandığında Bağımsız Örneklem T testi, karşılanmadığında Mann Whitney U testi kullanıldı.

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Bulgular: Vücut kompozisyonları karşılaştırıldığında, iskelet kası kütlesi ($p=0,001$) ve iskelet kas kütlesi indeksinde ($p=0,002$) sağlıklı grup lehine anlamlı bir fark vardı; fakat vücut kütle indeksi ve vücut yağ oranları benzerdi ($p>0,05$). Beslenme alışkanlıkları karşılaştırıldığında; süt/süt ürünü ($p=0,008$), et-balık ($p=0,001$), kurubaklagil ($p=0,008$) ve sıvı tüketimleri ($p=0,046$) sağlıklı grupta daha yüksekti, ancak yumurta tüketimleri benzer idi ($p>0,05$).

Sonuç: RA'lı hastaların sağlıklı kontrollere kıyasla, kas kütlesi daha az ve iskelet kas kütlesi indeks skorları daha düşük ve beslenme düzeyleri daha kötü idi. Bu sonuçlar ışığında, RA'lı bireylerin kas kütlesini artırıcı egzersiz yöntemlerinin yanı sıra beslenme alışkanlıklarını düzenleyen profesyonel merkezlerden destek almasını önermekteyiz.

Anahtar Sözcükler: Romatoid artrit, Vücut kompozisyonu, Beslenme alışkanlıkları

INTRODUCTION

Rheumatoid arthritis (RA), a systemic, chronic and autoimmune disease, results in functional disability due to chronic synovium inflammation and deformity of the joints (1,2). RA has a very high prevalence of up to 1% worldwide (3,4).

Joint involvement, functional deficiencies and comorbidities (cardiovascular disease risk, pulmonary involvement) caused by the disease, alters body composition in patients with RA (5-9). The main determinant in the formation of these changes is systemic inflammation. However, several other factors such as malnutrition, physical disability, comorbidities, corticosteroids and bDMARDs may also cause changes in the body composition of patients with RA (10,11).

Studies show that body fat and fat-free mass ratios and distribution are basic data for health. Having low fat-free mass and excess body fat for the general population are considered predictors of poor health (12). Loss of lean muscle mass is very important for health. Because even a 5% loss of lean muscle mass can have very serious consequences (changes morbidity and energy metabolism, altered, and increased susceptibility to infections and loss of muscle strength).

The mean loss of lean muscle mass in patients with RA ranges from 13% to 15% (13). In addition, although the weight of patients with RA does not change after the disease compared to the pre-disease, there is a loss of lean muscle mass and an increase in body fat mass in the progressive process. Loss of muscle mass and excessive fat at constant body weight, called as rheumatoid cachexia, was observed in two-thirds of patients with long-standing RA (14,15). Low lean muscle mass can lead to disabilities and metabolic abnormalities. An increase in fat mass may predispose to hypertension, diabetes, cardiovascular disease risk and obesity (16). Studies in the literature emphasized that patients with RA have a negative body composition compared to the healthy population (8,17,18).

The nutritional status of individuals is very critical to maintain the existing reserves in the body and to ensure the con-

tinuity of physiological activities (19). Nutritional status is an important component of disease activity in RA because of the beneficial effects of nutrients on inflammation and immunity (19,20).

Chronic diseases can lead to nutritional deficiencies and this is associated with worsening of vital and functional status. Chronic inflammation causes an increase in metabolic index and nutritional requirements and decreases food intake (19). Nutritional quality of patients with RA is lower than that of the healthy population (19,20). Poor nutritional quality increases the symptoms of the disease and creates functional disability (21,22).

A better understanding of the changes in body composition and nutritional status of patients with RA is key because of many potential effects, such as functional impairment and cardiometabolic risk (16,19,21,22). The aim of this study was to investigate the body composition and dietary habits of RA and to compare them with healthy controls.

MATERIALS and METHODS

In this study, which was planned as a case-control study, the dietary habits and body compositions of patients with RA were evaluated by comparing them with the healthy group. The dates determining the recruitment periods were January 2023- April 2023.

32 RA patients followed by Pamukkale University Rheumatology Clinic and diagnosed with RA by same rheumatologist according to classification criteria of 2010 EULAR/American College of Rheumatology (23) and 32 healthy individuals were included in the study.

Inclusion criteria: RA Group: having been diagnosed with RA, age 18 years and above, women gender, not using alcohol and smoking, volunteer to participate in the study. Healthy Group: age 18 years and above, women gender, not using alcohol and smoking, volunteer to participate in the study.

Exclusion criteria: RA Group: The presence of another disease (neurological, orthopedic and/or cardiopulmonary), concurrent autoimmune or inflammatory disease, serious

psychiatric conditions, malignancy, surgical history in the past year, being pregnant. Healthy Group: The presence of a disease (neurological, orthopedic, cardiopulmonary, autoimmune/ inflammatory disease, serious psychiatric conditions, malignancy), surgical history in the past year, being pregnant.

The ethical suitability of this study, which was carried out with Helsinki Declaration Principles, was approved by Ethics Committee of Pamukkale University at the board meeting dated 11.29.2022 and numbered 17. All participants were informed about the study and an informed consent form was signed by all of them.

After recording demographic data, body compositions (body mass index, body fat ratio, skeletal muscle mass, skeletal muscle mass index) were evaluated with the body analysis system device (Polosmart PSC12 Prolife) and dietary habits were evaluated with questions created by the researchers. Data were collected by the same researcher in a single session, approximately 20-25 minutes, using face-to-face interview technique.

Body Compositions: Body composition analyzes (body mass index, fat-free mass, body fat ratio) were measured with a Body Analysis System device (Polosmart PSC12 Prolife) in barefoot and without any metal on the participant. Skeletal muscle mass was calculated with Body Analysis System Device and the formula is skeletal muscle mass: body fat-free mass * 0.566). Skeletal muscle mass index was found by dividing the skeletal muscle mass obtained from this formula by the square of the height (24).

Dietary Habits: Dietary habits of the participants were evaluated with questions created by the researchers with reference to "The Mini-Nutritional Assessment" (25). These questions consist of meat/fish consumption (weekly-portion), legumes consumption (weekly-portion), egg consumption (weekly-piece), milk/dairy product consumption (daily-portion) and liquid consumption (daily-liter).

Statistical Analysis

As a result of the power analysis based on the skeletal muscle mass index parameter in the reference study (26), it was found that 32 subjects for each group must have been enrolled to have 80% power with 95% confidence level (d:0.636). The IBM SPSS Statistics for Windows, Version 22,0 (Armonk, NY) package program was used for data analysis. Continuous variables were expressed as mean \pm standard deviation and categorical variables as numbers and percentages. The conformity of the data to the normal distribution was examined with the Kolmogorov Smirnov test.

In the comparison of independent group differences, the Independent Samples T Test was used when the parametric test assumptions were met, and the Mann Whitney U test was used when the parametric test assumptions were not met. Statistical significance value was accepted as $p < 0.05$.

RESULTS

The study was first started with 77 individuals. Five RA patients did not want to participate. Seven RA patients had another autoimmune or inflammatory disease. One healthy individual had a surgery six months ago. Consequently, the study was completed with a total of 32 RA patients (mean age: 55.2 ± 1.5 years) and 32 healthy controls (mean age: 54.5 ± 1.5 years).

Data on demographic were given in Table 1. The mean disease duration of patients with RA was 14.3 ± 7.7 years. There was no difference between the groups in terms of demographic data ($p > 0.05$) (except body weights) (Table 1).

When comparing body compositions, there was a significant difference in skeletal muscle mass ($p = 0.001$) and skeletal muscle mass index ($p = 0.002$) in favor of the healthy group; but body mass index and body fat ratios were similar ($p > 0.05$) (Table 2).

When comparing the dietary habits, milk/dairy product ($p = 0.008$), meat/fish ($p = 0.001$), legumes ($p = 0.001$) and liquid ($p = 0.046$) consumptions were higher in healthy group; but egg consumption was similar ($p > 0.05$) (Table 3).

DISCUSSION

In this study, the patients with RA had lower skeletal muscle mass and skeletal muscle mass index than healthy controls. Also, the patients with RA consumed less meat/fish, legumes, milk-dairy products and liquids compared to healthy controls, and therefore their nutritional status was insufficient.

Patients with RA have lower fat-free mass and higher fat mass compared to healthy individuals, causing the abnormal body composition conditions (16). In the literature, there are many studies showing that the skeletal muscle mass of patients with RA decreases, whereas the fat mass does not change or increases compared to healthy controls (13,26-28).

Many case control studies in the literature were reported that fat-free mass index decreased and fat mass increased in RA than in healthy controls (8,29-32). In addition, the results were the same in studies whose sample consisted only of women with RA and compared with healthy ones (18,26,33-35).

Table 1: Demographic data of the participants.

Variables	RA (n=32)	Healthy Group (n=32)	p
Age (years)*	55.18±8.64 57 (37-78)	54.50±8.71 49 (31-66)	0.752**
Height (m)*	158.84±4.10 159.50 (150-166)	161.50±5.41 162 (152-173)	0.093***
Body weight (kg)*	66.29±12.96 69.12 (37.10-98)	72.94±10.88 74.35 (53.20-102)	0.030**
Body Mass Index (kg/m ²)*	26.67±5.69 27.70 (13.59-40.30)	28.01±4.30 26.75 (20.80-37.60)	0.291**
Vitamin D Level*	22.02±8.85 22.90 (10.10-40.30)	24.30±4.94 26.30 (12.66-33.04)	0.221**
Duration of Disease (years)*	14.34±7.69 12.50 (1-30)		
Educational Level, n(%)			
Primary- Secondary School	29 (90.6)	9 (28.1)	
High School	1 (3.1)	9 (28.1)	
University	1 (3.1)	6 (18.8)	
Master/PhD	1 (3.1)	8 (25)	
Marital Status, n(%)			
Married	1 (3.1)	5 (15.6)	
Single/Widow	31 (96.9)	27 (84.4)	

* Mean±Standard deviation, Median (Minimum-Maximum), **Independent Samples T Test, *** Mann Whitney U Test,

Table 2: Comparison of the participants in terms of body composition.

Variables	RA (n=32)	Healthy Group (n=32)	p
Body Mass Index* (kg/m ²)	26.67±5.69 27.70 (13.59-40.30)	28.01±4.30 26.75 (20.80-37.60)	0.291**
Body Fat Ratio* (%)	35.84±8.50 38.95 (16.40-48.20)	36.65±5.21 35.80 (27.90-45)	0.645**
Skeletal Muscle Mass* (kg)	22.77±3.82 24.10 (12.50-27.30)	26.50±3.11 26.85 (21.01-32.40)	0.001**
Skeletal Muscle Mass Index* (Skeletal Muscle Mass /m ²)	8.94±1.63 9.55 (4.50-11.50)	10.09±1.09 9.84 (8.20-12)	0.002**

*Mean±Standard deviation, Median (Minimum-Maximum), **Independent Samples T Test

Table 3: Comparison of the participants in terms of dietary habits.

Variables*	RA (n=32)	Healthy Group (n=32)	P
Meat/Fish Consumption* (weekly-portion)	1.75±0.87 2 (0-4)	2.93±0.91 3 (1-5)	0.001***
Legumes Consumption* (weekly-portion)	2.00±0.76 2 (1-3)	2.78±0.87 3 (1-6)	0.001***
Egg Consumption* (weekly-piece)	4.53±2.61 4 (1-4)	5.31±1.76 5 (1-10)	0.166**
Milk/Dairy Product Consumption* (daily-portion)	1.65±0.87 2 (0-3)	2.25±0.80 2 (1-3)	0.008***
Liquid Consumption* (daily-liter)	1.85±0.89 2 (1-5)	2.75±0.85 3 (2-5)	0.046***

*Mean±Standard deviation, Median (Minimum-Maximum), **Independent Samples T Test, *** Mann Whitney U Test,

One of the results of this study, in line with the literature, is that women with RA had lower skeletal muscle mass index and skeletal muscle mass compared to healthy controls. Body mass index and body fat ratio between the groups were similar. This may explain the fact that the body mass indexes of RA patients in the study were not much higher than the normal limits, so the body fat ratios were not higher than the healthy controls. In addition, the fact that women with RA are not very old may be another reason why there was no difference in fat ratio between the two groups.

Many factors are involved in the process of muscle mass loss, and nutrition is one of the most important and modifiable factors (36-38). Diet and nutrient intake are among the important components of disease activity in RA (39). Study reports were emphasized that inadequate nutrient intake and dietary habits were poorer in RA than healthy controls (40-42).

Helliwell et al. noted malnutrition in 26% of patients with RA. Transferrin, retinol-binding protein, serum albumin, folic acid, zinc, thyroxine-binding prealbumin were important six biochemical determinants. Malnourished RA had severe disease activity than other RA patients (43). Gómez-Vaquero et al. showed that patients with RA have poor nutritional status with impaired ratios in BMI, fat-free mass, and fat mass relative to the control population of the same age and sex (19). Tanski et al. found that 36.7% of patients with RA were at risk of malnutrition and 6.1% were malnourished. In addition, malnutrition was reported to be associated with cognitive impairment and severity of frailty syndrome (44). In the study of Berube et al., in which they examined the nutritional status of patients with RA using the Healthy Eating Index (HEI)-2010, 34.5% of the participants scored badly. They also found that many of the participants did not adhere to the recommended various nutrient intakes (21).

Bekar et al. emphasized that women with RA received less energy, protein and calcium and consumed less dairy products compared to healthy controls, but the difference was not significant (45). In the study of Doubek et al., 32.4% of women with RA were at risk of malnutrition and 1.4% of women were malnourished. In addition, according to BMI, 76% of the participants were overweight or obese, an increase in body fat percentage was found in 98.7% and a decrease in percentage of fat-free mass was found in 95.7% (46). Hejazi et al. found that intake of energy and certain micronutrients in women with RA was significantly lower than the recommended values (47).

Niksolat et al. reported that 92.1% of the elderly with RA had malnutrition, while 33.3% of the young people with RA had malnutrition (48).

Another result of this study is that the consumption of meat/fish, legumes, milk/dairy products and liquids in women with RA is lower than in the healthy control group. We think that it is important to investigate the causes of this nutritional deficiency (socio-economic status, loss of appetite, weakness, psychosocial reasons, etc.) and to support the patients because of this deficiency.

The strength of this study is that both body compositions and dietary habits of RA patients are examined in the same study and compared with healthy controls. The limitation of this study is that nutrition is questioned only in terms of the foods consumed and other factors that may affect nutrition (socio-economic status, loss of appetite, weakness, psychosocial reasons, following a special diet program or having any allergic reaction etc.) are not questioned. In future studies, we suggest that the factors that may affect nutrition were considered from a multidimensional perspective and that physical fitness should be included in the evaluation along with body composition. High consumption of olive oil and vegetables, known as the Mediterranean diet, may suppress disease activity in RA patients (49). Sala-Climent et al. stated that the Mediterranean diet without red meat, gluten and cow's milk may be anti-inflammatory and may be effective in improving chronic pain, stress and depression symptoms (50). In future studies, examining the effects of the Mediterranean diet, which can be applied to patients with diagnosed RA, on disease activity and inflammatory biomarkers may provide useful information.

Patients with RA had less muscle mass, lower skeletal muscle mass index scores, and worse nutritional levels compared to healthy controls. In the light of these results, in the light of these results, we recommend that patients with RA receive support from professional centers regulating dietary habits, as well as exercise methods that increase muscle mass.

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None

Author's Contributions

Concept: **Begüm Akar, Bilge Basakçı Calık, Ayşe Nur Bayındır Akbaş**, Design: **Begüm Akar, Bilge Basakçı Calık, Ayşe Nur Bayındır Akbaş**, Supervision: **Bilge Basakçı Calık, Veli Çobankara**, Materials: **Begüm Akar**, Data collection: **Begüm AKAR, Bilge Basakçı Calık, Ayşe Nur Bayındır Akbaş**, Data processing: **Begüm Akar, Elif Gur Kabul**, Analysis and interpretation: **Elif Gur Kabul, Bilge Basakçı Calık**, Literature search: **Begüm Akar**, Writing: **Begüm Akar, Elif Gur Kabul**, Critical review: **Bilge Basakçı Calık, Veli Çobankara**.

Conflict of Interest

The authors have no conflicts of interest to declare.

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Ethical Approval

Ethical approval of the study was obtained from the Non-Invasive Clinical Research Ethics Committee of Pamukkale University at the board meeting dated 29.11.2022 and numbered 17.

Peer Review Process

Extremely peer-reviewed and accepted.

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