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Effect of Islamic Fasting on the Severity of Rheumatoid Arthritis

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ABSTRACT

Introduction: Rheumatoid arthritis (RA) is a chronic, inflammatory, peripheral polyarthritis associated with unclear etiology. RA often leads to joint deformity and cartilage destruction in the patients. The present study aimed to assess the effect of Islamic fasting on the severity of RA.
Methods: This observational study was conducted on 28 patients with RA, who were randomly divided into two groups. The study was initiated two weeks before Ramadan and continued until one month after Ramadan in 2015. One group followed Islamic fasting during Ramadan, and the other group did not fast. The study groups were visited twice; the first visit was before Ramadan, and the second visit was after Ramadan. Data were recorded on the number of tender and swollen joints, disease activity score (DAS-28), visual analog scale (VAS) of the patients, VAS of the physicians, erythrocyte sedimentation rate (ESR), and C-reactive protein (CRP).
Results: The mean number of the tender joints decreased from 1.36±1.94 to 0.42±0.85 (P=0.02), and the mean number of the swollen joints decreased from 0.79±1.05 to 0.07±0.26 in the fasting group (P=0.02). In addition, DAS-28 and VAS of the physicians reduced significantly in the fasting group only, while the VAS score of the patients showed no significant reduction in the study groups. The mean DAS-28 decreased from 2.74±1.06 to 2.18±0.64 in the fasting group (P=0.003). Moreover, the mean DAS-28 decreased from 2.71±0.8 to 2.27±1.01 in the non-fasting group (P=0.24).
Conclusion: According to the results, Islamic fasting during the holy month of Ramadan could effectively decrease the severity of RA. However, further evidence is required to recommend this dietary intervention for patients with RA.

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Introduction

Rheumatoid arthritis (RA) is a chronic, inflammatory, peripheral polyarthritis associated with unknown etiology. The prevalence of RA has been estimated at 0.3-1% worldwide. RA largely influences the quality of life of the patients, often leading to joint deformity and destruction due to cartilage erosion (1, 2). The diagnosis of RA is usually based on the history of inflammatory arthritis and laboratory tests, such as rheumatoid factor and anti-citrullinated peptide antibody (3). Upon diagnosis, the patients should receive treatment; if RA remains untreated, joint erosion may lead to severe destructive joint disorders, which leads to the inability of the patients in performing daily tasks.

Various pharmacological and non-pharmacological interventions are currently available for the management of joint destruction in patients with RA. Disease-modifying antirheumatic drugs (DMARDs) are the cornerstone of the pharmacological interventions for RA (4). In addition to DMARDs, several non-pharmacological interventions have also been implemented for the management of patients with RA, such as physical exercise, patient education, and psychological treatments (5, 6). There are numerous reasons for the evaluation of these non-pharmacological treatments. Some of the contributing factors to the common use of these interventions for the management of RA are the complications caused by pharmacological treatments, publicity, and disease chronicity.

A non-pharmacological intervention that has been extensively studied in this regard involves assessing the effects of dietary modifications on patients with RA (7-12). The evidence obtained by *in-vitro* and animal studies indicates that dietary patterns and nutrients could affect RA activity (7). In other words, dietary modifications

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directly influence the inflammation process associated with RA, which is the key factor in the autoimmune nature of the disease (7, 9). In addition, changes in the intestinal flora and removal of potentially harmful foods are among the other suggested mechanisms for the dietary interventions in patients with RA (9). Some of the common dietary regimens that are used by patients with RA for the alleviation of the symptoms include adherence to vegetarian (13), Mediterranean (14), and elimination diets (15), the positive effects of which have been denoted in the literature.

Fasting is reported to be an effective dietary intervention for the management of RA. The effects of fasting on patients with RA have been previously investigated (16, 17). Furthermore, fasting has been evaluated along with consequent vegetarian or Mediterranean diets, with the provided evidence suggesting the effectiveness of fasting in this regard (10, 11). Islamic fasting requires individuals to avoid eating and drinking from dawn until sunset. The health benefits of Islamic fasting have been described in several conditions (18). However, further investigation is required to elucidate the beneficial role of fasting or Islamic fasting in patients with RA, as well as other chronic, disabling conditions (19)

The present study aimed to assess the effects of Islamic fasting on the severity of RA through the comparison of RA severity between fasting and non-fasting patients. It is assumed that the findings of the current research could enhance the knowledge regarding the major non-pharmacological interventions that are widely used for the management of patients with RA. In order to determine the beneficial effects of Islamic fasting, such therapeutic interventions are recommended for the management of these patients.

Materials and Methods

Research Design and Setting

This observational study was conducted at the Rheumatology Clinic of a university hospital in Kermanshah, Iran. The patients were selected from the general population of Kermanshah province. The study was initiated two weeks before Ramadan and continued until after Ramadan (one month of fasting) in 2015. The subjects were divided into two groups of Islamic fasting during Ramadan and non-fasting. It is notable that the patients were allowed to select their group for participation.

Sample Population

The sample population consisted of patients with RA, whose diagnosis had been confirmed using the EULAR and American College of Rheumatology criteria (2010) (20). The exclusion criteria of the study were as follows: 1) pregnancy; 2) nursing mothers; 3) concomitant rheumatologic diseases; 4) diabetes mellitus and 5) concomitant active gastrointestinal diseases (e.g., peptic ulcer).

The patients were selected via consecutive sampling, and the sample size was calculated to be 11 patients per group. Considering the possibility that some patients may not be able to complete the fasting duration of one month, 15 patients were recruited per each study group. With the allocation ratio of 1:1 and using simple randomization and random number table, the subjects were assigned to fasting and non-fasting groups. The study groups were homogenous in terms of age (maximum difference of two years), gender, RA activity based on the disease activity score (DAS-28), and administered medications for RA.

Measurement of the Variables

The patients were visited twice; the first visit was scheduled within two weeks before Ramadan, and the second visit was scheduled within two week after Ramadan. In the first visit, the thorough medical history of the patients was obtained from each participant, and complete physical examination was performed by a board-certified rheumatologist.

The demographic data of the subjects were collected by reviewing their medical records and face-to-face interviews, including age, gender, duration of RA, number of the painful joints, number of the swollen joints, administered medications, laboratory tests (erythrocyte sedimentation rate [ESR[, qualitative C-reactive protein [CPR], and white blood cell count [WBC]), DAS-28, and background medical history. In order to assess pain intensity, the visual analog scale (VAS) was used for the patients, in which higher scores indicated higher pain intensity. Moreover, VAS was completed by the researcher for the assessment of disease severity by physicians.

Statistical Analysis

Data analysis was performed in SPSS version 20 (IBM) using descriptive indices (frequency, percentage, mean, and standard deviation [SD]) to express the data. In addition, the Kolmogorov-Smirnov test was used to determine the normal distribution of the data, which indicated that the quantitative data had non-normal distribution. Therefore, comparison of the changes in the quantitative variables after the study period was carried out using the Wilcoxon test. In addition, McNemar's test was used to compare the frequency of positive CRP test results, and RA duration was compared between the study groups using the Mann-Whitney U test. In all the statistical analyses, the significance level was set at 0.05.

Ethical Observations

The study protocol was approved by the Research Ethics Committee of the university hospital. Upon the recruitment of the subjects, the objectives of the study were explained, and written informed consent was obtained prior to participation. Furthermore, the study protocol was in conformity with the Declaration of Helsinki.

Results

In total, 28 patients completed the study (14 per each group), and RA duration was comparable between the groups. The mean duration of RA was 4.36±4.29 years in the fasting group and 3.71±2.78 years in the non-fasting group (P=0.94).

According to the obtained results, the mean number of the tender and swollen joints decreased significantly in the fasting group. The mean number of the tender joints decreased from 1.36±1.94 to 0.42±0.85 in the fasting group (P=0.02), while the mean number of the swollen joints decreased from 0.79±1.05 to 0.07±0.26 in this group (P=0.02). However, such reduction was not observed in the non-fasting group (Table 1).

Table 1. Comparison of Mean Number of Tender and Swollen Joints at Baseline and after Ramadan in 28 Patients with Rheumatoid Arthritis in Fasting (n=14) and Non-fasting Groups (n=14)

		Before Ramadan	After Ramadan	*P-value
Number of Tender Joints	Fasting	1.36±1.94	0.42±0.85	0.02
	Non-fasting	0.63±1.01	0.29±0.61	0.18
Number of Swollen Joints	Fasting	0.79±1.05	0.07±0.26	0.02
	Non-fasting	0.14±0.36	0.07±0.26	0.31

**P-value adjusted by Wilcoxon test*

According to the findings, the mean DAS-28 decreased significantly in the fasting group, while the reduction in the DAS-28 was not considered significant in the non-fasting group. The mean DAS-28 decreased from 2.74±1.06 to 2.18±0.64 in the fasting group (P=0.003). On the other hand, the mean DAS-28 decreased from 2.71±0.8 to 2.27±1.01 in the non-fasting group (P=0.24) (Table 2).

Table 2. Comparison of Mean DAS-28, Patient VAS, and Physician VAS at Baseline and after Ramadan in 28 Patients with Rheumatoid Arthritis in Fasting (n=14) and Non-fasting Groups (n=14)

		Before Ramadan	After Ramadan	*P-value
DAS-28	Fasting	2.74±1.06	2.18±0.64	0.003
	Non-fasting	2.71±0.8	2.27±1.01	0.24
Patient VAS	Fasting	27.14±16.83	20±12.40	0.07
	Non-fasting	22.14±28.56	28.57±24.76	0.23
Physician VAS	Fasting	12.14±15.77	1.42±3.62	0.02
	Non-fasting	7.86±9.75	5±5.18	0.1

**P-value adjusted by Wilcoxon test*

According to the obtained results, the VAS score as graded by the patients had a marginally significant reduction after the study period in the fasting group. On the other hand, the VAS score as graded by the investigator had a significant reduction in the fasting group, while such reduction was not observed in the non-fasting group (Table 2). According to the DAS-28 categories, 85.7% of the patients in the fasting group significantly improved compared to the non-fasting group (64.3%).

According to the findings, six patients in the fasting group had positive CRP test results in the first visit, which decreased to one patient in the second visit (P=0.99). In this regard, one and two patients in the non-fasting group had positive CRP results at baseline and in the second visit, respectively (P=0.12). Table 3 shows the changes

in the WBC count and ESR values after the study period. As can be seen, changes in ESR and WBC were both statistically significant in the fasting group, while such significance was not denoted in the non-fasting group.

Table 3. Comparison of Mean ESR and WBC Count at Baseline and after Ramadan in 28 Patients with Rheumatoid Arthritis in Fasting (n=14) and Non-fasting Groups (n=14)

		Before Ramadan	After Ramadan	*P-value
ESR (mm/h)	Fasting	14.14±13	12.79±8.22	0.001
	Non-fasting	25.14±15.9	18.07±15.9	0.32
WBC (per ml)	Fasting	7300±1533.15	7314.29±1374.24	0.04
	Non-fasting	6635±1467.07	7312.14±1375.24	0.82

**P-value adjusted by Wilcoxon test*

In general, the obtained results indicated that the mean DAS-28, ESR, CRP, WBC count, and VAS score significantly decreased in the fasting group compared to the non-fasting group as graded by the patients and physicians.

Discussion

According to the results of the present study, Islamic fasting during the holy month of Ramadan had significant beneficial effects on several parameters. Fasting significantly influenced the number of the tender and swollen joints, DAS-28, ESR, and WBC count. However, such effects were not observed in the non-fasting group.

Considering that Islamic fasting is a common practice among Muslims across the world and several studies have previously described the beneficial effects of fasting on various conditions (16, 18, 19), the current research aimed to determine the effects of fasting on the severity of RA. In many Islamic countries, RA patients tend to ask rheumatologists or primary healthcare providers a common question of whether they are able to fast when they approach the holy month of Ramadan. Furthermore, the patients inquire about whether fasting could alleviate RA symptoms, especially pain and joint swelling.

The therapeutic effects of religious fasting have been extensively described in previous studies. Fasting therapy might contribute to the prevention and treatment of chronic diseases (21). Currently, overfeeding is a major public health concern in many countries. As such, several studies have evaluated various effects of fasting, as well as its patterns and approaches, on patients with acute and chronic diseases. In addition, fasting has been associated with longevity (22).

A study in this regard was conducted on 31 patients with RA, who were divided into fasting and non-fasting groups during Ramadan. The obtained results showed the improvement of the clinical and global assessment of the patients in the fasting group (18). This is consistent with the results of the present study regarding the beneficial effects of religious fasting during Ramadan on the severity of RA.

Recommendation of fasting to patients with RA is associated with various assumptions, the most important of which is the dose interval of the administered medications. Although ill individuals are exempted from fasting according to the Islamic law, it is rather challenging to draw the line between severely ill individuals and those who are healthier (23). This issue depends on the decision of the physician and the patient to report whether they are able to tolerate fasting. In the present study, one patient per each group did not complete the study, which indicated that most of the patients could tolerate fasting and experienced a significant reduction in the severity of RA.

In another research, the effects of fasting followed by one year of adherence to a vegetarian diet were assessed in a randomized, single-blind, controlled trial. After an initial 7-10 days of subtotal fasting, 27 patients followed an individually-adjusted, gluten-free vegan diet for 3.5 months. After four weeks, the diet group showed significant improvement in the number of the tender joints, Ritchie articular index, number of the swollen joints, duration of morning stiffness, grip strength, ESR, CRP, WBC count, and a health assessment questionnaire score. It is notable that the health benefits in the diet group persisted after one year, and evaluation of the entire course of the study demonstrated significant advantages in the diet group in terms of all the measured indices (17).

In the current research, data were not documented regarding nutrient and calorie intakes. Although most of the patients followed a relatively similar conventional Iranian diet during Ramadan, it is likely that there were some differences in the dietary habits and food

composition between the study groups, which might have potentially affected the severity of RA and were not measured in the current research.

Limitations of the Study

One of the limitations of the present study was the relatively small sample size. Therefore, further investigations are required on larger sample sizes in order to confirm our findings. Another limitation was the different dietary regimens of the subjects.

Conclusion

According to the results, Islamic fasting during the holy month of Ramadan could effectively reduce the severity of RA. This study could be considered as a primary research to propose similar dietary interventions for patients with RA. It is recommended that further investigations in this regard be conducted on larger sample sizes in order to support our findings.

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