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ORIGINAL ARTICLE

An investigation of coronaphobia and physical activity among patients with rheumatoid arthritis

Gonca Sağlam[1], Emine Esra Ergül[2]

[1]Department of Physical Medicine and Rehabilitation, Karadeniz Technical University Faculty of Medicine, Trabzon, Türkiye
[2]Department of Physical Medicine and Rehabilitation, Erzincan Binali Yıldırım University Mengücek Gazi Training and Research Hospital, Erzincan, Türkiye

ABSTRACT

Objectives: This study aims to investigate coronaphobia and physical activity levels in patients with rheumatoid arthritis (RA).

Patients and methods: Between December 2021 and February 2022, a total of 68 RA patients (11 males, 57 females; mean age: 48.3±10.1 years; range, 29 to 78 years) and 64 age- and sex-matched healthy individuals (4 males, 60 females; mean age: 47.9±10.2 years; range, 23 to 70 years) were included in this cross-sectional study. Demographic, physical, lifestyle, and medical characteristics of all participants were recorded. The COVID-19 Phobia Scale (C19PS) and the International Physical Activity Questionnaire-Short Form (IPAQ-SF) were administered to all participants. The RA patients were divided into two groups as: patients treated with biological and non-biological agents. The Disease Activity Score-28 (DAS28) and Clinical Disease Activity Index (CDAI) were used to measure disease activity.

Results: The total and subgroup scores of the C19P-S were found to be statistically significantly higher in both the biological and non-biological RA groups than in the control group (p=0.001). However, there was no statistically significant difference between the RA groups in terms of total and subgroup C19P-S scores. The mean IPAQ score was significantly lower in the RA group using biological drugs than in the control group (p=0.002). A significant correlation was found between DAS28 and total C19P-S scores (r:0.63, p<0.05), and CDAI and total C19P-S scores (r:0.79, p<0.05).

Conclusion: Patients with RA have an increased risk of coronaphobia and disease activity is correlated with coronaphobia. Patients treated with biological agents seem to have lower activity levels compared to other RA patients and healthy controls. These results should be considered in the management of RA during COVID-19 pandemic and preventive intervention strategies should be formulated to cope with coronaphobia.

Keywords: Coronaphobia, physical activity, rheumatoid arthritis.

The World Health Organization (WHO) declared the novel coronavirus disease 2019 (COVID-19) disease to be a global public health emergency in January 2020. So far, life around the world has been upended with lockdowns, social distancing, school and work closures with increasing numbers of infected individuals. Fear, anxiety, and concerns have been the primary psychological effects of the COVID-19 pandemic, as they have been in past pandemics such as hemagglutinin type 1 and neuraminidase type 1 (H1N1), severe acute respiratory syndrome (SARS), Middle East respiratory syndrome (MERS), and Ebola.[1-3] As the mortality death toll caused by COVID-19 continues to rise, the number of individuals who experience elevated and prolonged fear and anxiety appears to be growing, as well.[4]

A phobia is a type of anxiety condition marked by a persistent, irrational dread of a certain item, person, animal, activity, or circumstance. The Diagnostic and Statistical Manual of Mental

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Correspondence: Gonca Sağlam, MD. Karadeniz Teknik Üniversitesi Tıp Fakültesi Fiziksel Tıp ve Rehabilitasyon Anabilim Dalı, 61080 Ortahisar, Trabzon, Türkiye.
Tel: +90 505 - 452 56 88 e-mail: goncasaglam@hotmail.com

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Disorders (DSM) defines five categories of specific phobias: natural environment, animal, blood injection-injury, situational, and others (DSM-V).[5] Individuals with phobias attempt to avoid the things that make them afraid; when this is not feasible, they experience anxiety and discomfort. During the COVID-19 pandemic period, individuals are typically frightened of becoming infected with COVID-19 and the term "coronaphobia" is first appeared in the literature.[6,7] It is described as persistent and severe anxiety of the novel coronavirus and maybe a new emerging phobia specific to COVID-19 as one of the DSM-V-specified phobias.[8] Coronaphobia is associated with excessive concern about physiological symptoms, significant stress about personal and occupational loss, increased reassurance and safety seeking behaviors, and avoidance of public places and situations, resulting in significant impairment in daily life functioning according to a review of relevant studies.[9]

Given the fact that COVID-19 pandemic affects psychological, emotional, and mental status, it is critical to recognize early indications of coronaphobia to give timely support to people who have severe coronaphobia.[10] The identification of risk factors and potential associated diseases for coronaphobia may help in the management of this issue. Previously, a few studies have been focused on the consequence of the pandemic on the mental and psychological health and well-being of patients with chronic inflammatory diseases. The aim of this study was to investigate coronaphobia and physical activity level in patients with rheumatoid arthritis (RA) using both biological and non-biological agents compared to healthy controls.

PATIENTS AND METHODS

This cross-sectional study was conducted at Erzincan Binali Yıldırım University Mengücek Gazi Training and Research Hospital, Department of Physical Medicine and Rehabilitation between December 2021 and February 2022. A total of 68 patients (11 males, 57 females; mean age: 48.3±10.1 years; range, 29 to 78 years) who met the 2010 American College of Rheumatology (ACR)/European Alliance of Associations for Rheumatology (EULAR) RA classification criteria and were diagnosed with RA were included in the study. A total of 64 age- and sex-matched healthy adults (4 males, 60 females; mean age: 47.9±10.2 years; range, 23 to 70 years) were examined as the control group. Exclusion criteria were as follows: COVID-19 history, severe psychological disorders such as schizophrenia, psychiatric drug use, history of neurological disease, malignancy, acute infection, pregnancy or breastfeeding, previous or present diagnosis of fibromyalgia, and inability to fill out the questionnaires. Participants' family members, coworkers, or neighbors who had a history of COVID-19 and mortality were also excluded. All participants' demographic data (age, weight, height, sex, marital status, location of residence, educational and work status), smoking status, access to COVID-19 information (television, radio, social media) were collected. The medical data of the RA patients such as number of swollen and tender joints, and C-reactive protein (CRP) (mg/dL) levels were also noted. The Disease Activity Score-28 (DAS28) and the Clinical Disease Activity Index (CDAI) were used to assess disease activity.

The RA patients were divided into two groups including patients treated with biological agents as Group 1 (n=33) and with non-biological agents as Group 2 (n=35). Two standardized questionnaires were used in this study including the COVID-19 Phobia Scale (C19P-S) and International Physical Activity Questionnaire-Short Form (IPAQ-SF). The RA groups (Groups 1 and 2) and control group (Group 3) were compared.

The severity of coronaphobia was evaluated using the C19P-S. The C19P-S is a 20-item self-report questionnaire with four subscales: psychological, psychosomatic, economic, and social. On a five-point scale, from "strongly disagree[1]" to "strongly agree,[5]" all items are scored. The overall score ranges from 20 to 100 points; the greater the score, the more coronaphobia is present.[6]

The IPAQ-SF is a widely used questionnaire to assess physical activity levels. It records the last-seven-day recall for four intensity levels of physical activity: vigorous activity, moderate activity, walking, and sitting.[11] The data were converted to metabolic equivalent minutes per week (MET-min/week) according to the formulation of Ainsworth et al.[12]

Table 1. Demographic and clinical features of participants in the study

	Biologic				Non-biologic				Control				
	n	%	Mean±SD	Median	n	%	Mean±SD	Median	n	%	Mean±SD	Median	*p*
Age (year)				45				49				47	0.34*
Sex													0.06†
Female	30	90.9			27	77.1			60	93.8			
Male	3	9.1			8	22.9			4	6.2			
BMI (kg/m^2)				26.3				26.3				26.4	0.83*
Marital status													0.78†
Married	30	90.9			32	91.4			56	87.5			
Single	3	9.1			3	8.6			8	12.5			
CRP			5.26±1.74				7.15±1.60				-		0.27‡
DAS28			2.7±0.5				2.9±0.9				-		0.19‡
CDAI			10.8±2.1				11.5±2.6				-		0.52‡

SD: Standard deviation; BMI: Body mass index; CRP: C-reactive protein; DAS28: Disease Activity Score 28; CDAI: Clinical Disease Activity Index; * Kruskal-Wallis test; † Chi-Square test; ‡ Student's t test.

Table 2. Education status, professions, location, living environment, smoking, steroid usage, COVID news sources, IPAQ scores of the participants

	Biologic		Non-biologic		Control		
	n	%	n	%	n	%	*p**
Education							0.03
Primary school	13	39.4	12	34.3	35	54.7	
High school	12	36.4	8	22.9	19	29.7	
University	8	24.2	9	25.7	10	15.6	
Bachelor's degree	0	0.0	6	17.1	0	0.0	
Professions							0.47
Work outside the home (all day)	7	21.2	11	31.4	10	15.6	
Work outside the home (half day)	6	18.2	6	17.1	13	20.4	
Housewife	18	54.5	13	37.1	31	48.4	
Retired	2	6.1	5	14.4	10	15.6	
Location							0.06
City	24	72.7	28	80.0	54	84.4	
Town	7	21.2	3	8.6	10	15.6	
Village	2	6.1	4	11.4	0	0.0	
Living environment							0.94
Single	3	9.1	3	8.5	4	6.2	
With his/her spouse	10	30.3	8	22.9	17	26.6	
With his/her spouse and children	20	60.6	23	65.7	41	64.1	
With an elderly person	0	0.0	1	2.9	2	3.1	
Smoking							0.74
Yes	2	6.1	2	5.7	2	3.1	
No	31	93.9	33	94.3	62	96.9	
Steroid							0.05
Yes	7	21.2	15	42.9	-	-	
No	26	78.8	20	57.1	-	-	
COVID news transportation							0.13
TV/Radio	1	3.0	4	11.4	0	0.0	
TV/Radio+FFE	10	30.3	11	31.4	18	28.1	
TV/Radio+SM+HCP	0	0.0	1	2.9	0	0.0	
TV/Radio+FFE+HCP	6	18.2	3	8.6	10	15.6	
TV/Radio+SM+FFE+HC	16	48.5	16	45.7	36	56.3	
IPAQ category							0.004
Inactive	25	75.8	19	54.3	26	40.6	
Minimally active	8	24.2	16	45.7	38	59.4	

COVID-19: Coronavirus disease 2019; IPAQ: International Physical Activity Questionnaire; FFE: Friend-family environment; SM: Social media; HCP: Healthcare professionals; * Chi-square test.

(Walking =3.3 METs, Moderate Physical Activity =4.0 METs and Vigorous Physical Activity =8.0 METs).

Statistical analysis

Statistical analysis was performed using the IBM SPSS version 23.0 software (IBM Corp., Armonk, NY, USA). Descriptive data were expressed in mean ± standard deviation (SD), median (min-max) or number and frequency. The variables were investigated using visual (histograms, probability plots) and analytical methods (Kolmogorov-Smirnov/Shapiro-Wilk test) to determine whether or not they were normally distributed. The Kruskal-Wallis, Student t-test, and chi-square tests were used to compare the parameters between the groups. The Mann-Whitney U test was performed to analyze the significance of pairwise differences using the Bonferroni correction. The Pearson correlation analysis was performed to examine the relationships between parameters. A p value of <0.05 was considered statistically significant.

RESULTS

Demographic and clinical characteristics of the participants are shown in Table 1. No significant differences were found among the RA groups using biological drugs, the RA group using non-biological drugs, and the control group in terms of age, sex, body mass index (BMI), and marital status.

Education status, professions, location, living environment, smoking, steroid usage, COVID-19 news sources, IPAQ categories of the study group are given in Table 2. The results of the comparison of C19P-S and IPAQ scores among groups and pairwise comparisons are presented in Tables 3

Table 3. Comparison of C19P-S scores of groups

C19P-S Score (median)	Biological	Non-biological	Control	p^*	Pairwise comparisons	$p\dagger$
Psychological	19	17	12.5	<0.001	Biologic *vs.* Non-biologic Biologic *vs.* Control Non-biologic *vs.* Control	0.11 **<0.001** **<0.001**
Psychosomatic	13	13	10	<0.001	Biologic *vs.* Non-biologic Biologic *vs.* Control Non-biologic *vs.* Control	0.80 **<0.001** **<0.001**
Social	15	13	8	<0.001	Biologic *vs.* Non-biologic Biologic *vs.* Control Non-biologic *vs.* Control	0.07 **<0.001** **<0.001**
Economic	9	8	5	<0.001	Biologic *vs.* Non -biologic Biologic *vs.* Control Non-biologic *vs.* Control	0.36 **<0.001** **<0.001**
Total	58	51	35.5	<0.001	Biologic *vs.* Non-biologic Biologic *vs.* Control Non-biologic *vs.* Control	0.05 **<0.001** **<0.001**

C19P-S: COVID-19 Phobia Scale; * Kruskal-Wallis test; † Mann-Whitney U test with Bonferroni correction.

Table 4. Comparison of IPAQ scores of groups

	Biologic	Non-biologic	Control	p^*	Pairwise comparisons	$p\dagger$
IPAQ Score (median)	198	462	495	0.002	Biologic *vs.* Non-biologic Biologic *vs.* Control Non-biologic *vs.* Control	0.09 **0.002** 0.89

IPAQ: International Physical Activity Questionnaire; * Kruskal-Wallis test; † Mann-Whitney U test with Bonferroni correction.

Table 5. Correlation between clinical factors, total C19P-S and IPAQ scores

		Total C19P-S score	IPAQ score
CRP	r	0.17	0.25
	p	0.08	0.18
DAS28	r	0.63	0.34
	p	<0.05	0.18
CDAI	r	0.79	0.16
	p	<0.05	0.08
IPAQ score	r	0.43	
	p	0.26	

C19P-S: COVID-19 Phobia Scale; IPAQ: International Physical Activity Questionnaire; CRP: C-reactive protein; DAS28: Disease Activity Score-28; CDAI: Clinical Disease Activity Index.

and 4. The C19P-S total score and psychological, psychosomatic, social, and economic subgroup scores were found to be statistically significantly higher in both of the RA groups using biological drugs and non-biological drugs than in the control group ($p<0.001$). However, there was no statistically significant difference between the RA group using biological drugs and the RA group using non-biological drugs in terms of total C19P-S score and psychological, psychosomatic, social, and economic subgroup scores. The IPAQ score was significantly lower in the RA group using biological drugs than in the control group ($p=0.002$). There was no statistically significant difference in other pairwise comparisons in terms of the IPAQ scores.

Correlation analysis of CRP, DAS28, CDAI, total C19P-S score and IPAQ score is shown in Table 5. A significant correlation was observed between DAS28 ($r=0.63$, $p<0.05$), CDAI ($r=0.79$, $p<0.05$) and total C19P-S scores.

DISCUSSION

There is convincing evidence that COVID-19 pandemic has worsened mental and emotional status of all individuals around the world. This situation has spawned a global fear known as coronaphobia. Previous studies demonstrated that the prevalence of chronic illnesses is linked to a greater risk of severe disease and fatality and the epidemic has made routine health care for people with chronic illnesses more difficult.[13] To the best of our knowledge, this is the first study to demonstrate the presence of coronaphobia in patients with RA. The results of this study indicate that coronaphobia was determined at a statistically significantly higher level among patients with RA compared to healthy individuals and RA patients with higher disease activity exhibited higher coronaphobia scores. In addition, RA patients using biological agents had lower physical activity levels according to our results.

In this pandemic era, Ozamiz-Etxebarria et al.[14] found that those with chronic disease had more emotional disturbance (stress, anxiety, and sadness) than those without the chronic diseases. Moreover, Karaaslan et al.[15] reported that the existence of chronic illnesses was linked to a higher coronaphobia score and patients with chronic diseases were 1.27 times more likely than non-chronic disease participants to have high coronaphobia scores. Similarly, Tzur Bitan et al.[13] found that those with chronic conditions were more likely to develop coronaphobia (odds ratio: 1.07) than those people without chronic diseases. These results might be linked to the increased emotional reactivity and mortality due to COVID-19.[16-18]

Several researches have been carried out to examine psychological problems that are associated with RA. Comorbid mental illnesses are commonly detected in patients with RA, and they can worsen patients' quality of life.[19] The incidence and prevalence of depression, anxiety disorder, and bipolar disorder are higher in the RA population compared to a matched control group.[20] Fibromyalgia syndrome sufferers' difficulty in numerous activities, exercise, and routine medical care as a result of the COVID-19 epidemic is considered to have enhanced anxiety and phobic reactions.[21] Similarly, our results revealed an increased rate of coronaphobia among RA patients.

Recent data in the literature have indicated that the immune system and neuroinflammation have a role in the emerging of anxiety and depression[22] Liu et al.[23] reported that the levels of proinflammatory cytokines including interleukin (IL)-17, tumor necrosis factor-alpha (TNF-α) and IL-6 are found to be substantially

higher in patients with RA than in healthy controls and RA patients with anxiety exhibited significantly increased IL-17 levels. A positive correlation was found between the degree of anxiety and IL-17 levels in patients with RA. Significantly, more than 60% of patients with systemic autoinflammatory diseases reported that the pandemic influenced their illness management; over half of these individuals were mentally afflicted and had to deal with unpleasant feelings.[24]

Physical activity has a significant influence on health. Exercises may help to alleviate the pathological effects of upper respiratory tract infection caused by microorganisms such as coronavirus by stimulating the release of stress hormones. These hormones are responsible for reducing excessive local inflammation in the respiratory tract and inducing the secretion of anti-inflammatory cytokines like IL-4 and IL-10 to prevent excessively long T-helper type 1 (Th1) cell population activity against the pathogen, which can lead to cell damage and necrosis.[25-28] Physical activity has also been shown to improve mental well-being and can reduce symptoms of mental health disorders such as depression and anxiety, according to several studies. Maugeri et al.[29] showed that the pandemic resulted in a considerable fall in total weekly physical activity energy expenditure in all age groups, particularly in men, which has a detrimental impact on psychological well-being. This study concluded that keeping regular physical activity during a forced rest time, such as the current COVID-19 pandemic, was a crucial preventative approach for physical and mental health. According to our results, the patients treated with biological agents had lower physical activity levels compared to healthy controls. This result indicates a necessity of a regular physical activity and an exercise program recommendation, particularly in this RA group.

This study is significant, since it is the first to establish the existence of coronaphobia in patients with RA and its relationship with disease activity in the literature. A power analysis was performed to determine the minimum sample size before the initiation of the study and we achieved an adequate number of participants. The severity of coronaphobia was assessed using the C19P-S questionnaire. A previous review showed that it was one of the few scales to comprehensively evaluate mental health problems related to COVID-19.[34] The presence of additional diseases or emotional disorders during the pandemic may affect coronaphobia. We excluded several factors that may contribute to the emerging of coronaphobia.

Nevertheless, this study has some limitations. First, it was conducted within a cross-sectional design. Thus, it is impossible to conclude why coronaphobia occurs more frequently in RA patients or what causes coronaphobia to develop in RA patients. Another limitation is that other characteristics such as self-efficacy and personality that might affect the incidence of psychiatric disorders were not included in this study. As a result, further research is warranted to investigate the cause-and-effect relationships. It is critical to assess the well-being status and mental health of RA patients to avoid more complicated disorders and to fight against pandemics such as COVID-19. Optimal physical activity and exercise program should be included in the management of RA.

In conclusion, our study results suggest that RA patients are more concerned about the pandemic. Early detection of coronaphobia in individuals who are prone to psychological problems, such as those with RA, is critical for giving prompt psychological assistance and keeping the disease under control. A psychiatric approach to RA patients should be included in the management of disease to prevent coronaphobia among these patients in the unprecedented situation of COVID-19 pandemic.

Ethics Committee Approval: The study protocol was approved by the Erzincan Binali Yıldırım University Mengücek Gazi Training and Research Hospital Ethics Committee (date: 07.12.2021, no: 13-02). The study was conducted in accordance with the principles of the Declaration of Helsinki.

Patient Consent for Publication: A written informed consent was obtained from each participant.

Data Sharing Statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

Author Contributions: Conceived and designed the study, collected the data: E.E.E.; Data analysis and interpretation, involved in preparation of the figures and manuscript, prepared the manuscript and reviewed the literature: G.S.; All authors have read the manuscript and agreed to the conclusion.

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