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The effect of SARS-CoV2 disease on fatigue, sleep, physical activity, and kinesiophobia in patients with systemic hypertension

Sistemik hipertansiyonu olan bireylerde SARS-CoV2 hastalığının yorgunluk, uyku, fiziksel aktivite ve kinezyofobi üzerine etkisi

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ABSTRACT

Aim: No other studies investigated fatigue, sleep, physical activity, and kinesiophobia in individuals with hypertension. The present study aimed to investigate the effect of SARS-CoV2 disease on fatigue, sleep, physical activity, and kinesiophobia in individuals with systemic hypertension.

Materials and Methods: A prospective cross-sectional study was carried out with a total of 99 people with hypertension, including 53 of them with SARS-CoV2 disease history. Patients were evaluated with the "International Physical Activity Questionnaire Short Form (IPAQ-SF), Fatigue Severity Scale (FSS), Tampa Scale of Kinesiophobia for Heart (TSK Heart), and Pittsburgh Sleep Quality Index (PSQI)".

Results: People with hypertension in the SARS-CoV2 positive group had a significantly higher moderate PA sub score of the IPAQ (Metabolic Equivalent of Task (MET) minutes per week) (p=0.014). Besides, the FSS scores of SARS-CoV2 positive patients were significantly higher (p=0.019). FSS was moderately associated with TSK Heart and PSQI (r_1=0.575, r_2=0.654, respectively). TSK Heart was moderately correlated with moderate PA sub score of the IPAQ and IPAQ-Total score (r_1=-0.394, r_2=-0.436, respectively).

Conclusion: SARS-CoV2 was found to be responsible for fatigue in people with hypertension. Kinesiophobia was related with both total and moderate PA in COVID-19 positive hypertension patients. Besides, fatigue was correlated with kinesiophobia and sleep quality.

Keywords: COVID-19, fear of movement, primary hypertension, psychological status.

ÖZ

Amaç: *Hipertansiyonlu bireylerde yorgunluk, uyku, fiziksel aktivite ve kinezyofobiyi araştıran başka bir çalışmaya rastlanmamıştır. Bu çalışma, sistemik hipertansiyonu olan bireylerde SARS-CoV2 hastalığının yorgunluk, uyku, fiziksel aktivite ve kinezyofobi üzerindeki etkisini araştırmayı amaçlamıştır.*

Gereç ve Yöntem: *53'ü SARS-CoV2 hastalık öyküsü olan hipertansiyonlu toplam 99 kişi ile prospektif kesitsel bir çalışma yapıldı. Hastalar "Uluslararası Fiziksel Aktivite Anketi Kısa Formu (UFAA-KF), Yorgunluk Şiddet Ölçeği (YŞÖ), Tampa Kalp için Kinezyofobi Skalası (TKKS) ve Pittsburgh Uyku Kalitesi İndeksi (PUKİ)" ile değerlendirildi.*

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Bulgular: *SARS-CoV2 pozitif gruptaki bireyler, UFAA-KF'nin orta-şiddetli fiziksel aktivite skorunda anlamlı derecede daha az puana sahipti (p=0,014). Ayrıca SARS-CoV2 pozitif hastaların YŞÖ skorları anlamlı olarak daha yüksekti (p=0,019). YŞÖ, TKKS ve PUKİ ile orta derecede ilişkiliydi (r_1=0,575, r_2=0,654). TKKS, UFAA-KF'nin orta dereceli fiziksel aktivite ve UFAA-Toplam puanı ile orta derecede korele idi (r_1=-0,394, r_2=-0,436).*

Sonuç: *SARS-CoV2'nin hipertansiyonlu kişilerde yorgunluktan sorumlu olduğu sonucuna varıldı. Kinezyofobi, COVID-19'lu hipertansiyon hastalarında fiziksel aktivite (orta şiddetli ve toplam skor için) ile ilişkiliydi. Ayrıca yorgunluk, kinezyofobi ve uyku kalitesi ile ilişkiliydi.*

Anahtar Sözcükler: *COVID-19, hareket korkusu, primer hipertansiyon, psikolojik durum.*

INTRODUCTION

Individuals with cardiovascular disease have been greatly affected by the SARS-CoV2 pandemic. In the early stages of the pandemic, mortality rates due to hypertension and ischemic heart disease were high. The increase in deaths due to hypertensive disease increased by 1, 17 (1). Among the risk factors that cause mortality in hospitalized patients due to SARS-CoV2, the most common condition is hypertension, with a rate of 30% (2). It has been reported that hypertension is the most common comorbidity, with a rate of 27% in individuals with SARS-CoV2 who develop Acute Respiratory Distress Syndrome (ARDS) (3). It has been stated that blood pressure control is essential in reducing the burden of disease (4). Hypertension and other cardiovascular risk factors have been found to be associated with the risk and severity of infection (5). However, it is still debated how risky the presence of hypertension in individuals with SARS-CoV2 or the medical treatment of hypertension is for infection (6). It has been reported that the severity of SARS-CoV2 is higher in individuals with hypertension (7). According to the data from UK Biobank, individuals with hypertension have a higher risk of pneumonia than other individuals (8). There is not enough research on the clinical features of individuals with hypertension diagnosed with SARS-CoV2. Fever, cough, and fatigue are most common in these patients (9). Sleep disorders increased by 33,9% in individuals with at least one non-communicable disease during the pandemic period, such as hypertension (10). It has been reported that post-COVID symptoms persist for a long time in individuals with hypertension, and their sleep quality is worse than in normotensive individuals. However, although hypertension is associated with poor sleep quality, it is also stated that this condition cannot be directly linked to SARS-CoV2 infection (11). However, it has been reported that insomnia, sleep disruption, and psychosocial problems are more common among people due to the SARS-CoV2 pandemic, especially in women (12). It has been reported that long-term fatigue, depression, muscle pain, and sleep problems, consistent with chronic fatigue syndrome symptoms, persist for a long time in individuals with SARS-CoV2 (13). Cardiac and pulmonary effects (e.g., pulmonary fibrosis, pulmonary hypertension, and pulmonary thromboembolism) are common in individuals who have had SARS-CoV2. Dyspnea, fatigue, and decreased exercise tolerance are observed during exertion (14). In hypertensive individuals, the SARS-CoV2 pandemic has caused a decrease in the level of physical activity and sedentary behavior changes, especially on weekends (15). Among the reasons for this sedentary behavior, the implementation of quarantine measures and social isolation negatively affected the participation of people in physical activity. It is comprehended that physical activity is an essential indicator of maintaining health and well-being. Therefore, the risk of mortality could occur due to the negative effects of physical inactivity in the long term (16). It is known that physical activity and exercise are beneficial in treating, preventing, and managing hypertension (17). It has been reported that individuals with hypertension during the pandemic period exhibit sedentary behavior, have lower physical activity levels, have depression, and decrease their quality of life, even though their cardiovascular risk factors increase (18). Fear of movement (kinesiophobia) may occur in individuals with different diseases due to the wrong idea that "I may be injured again" (19, 20). Kinesiophobia may be an important factor in decreasing the level of physical activity and participation of individuals in rehabilitation (19). Hypertension individuals with low physical activity levels have higher kinesiophobia scores (19, 21). There are no

adequate studies on kinesiophobia in individuals with hypertension. Kinesiophobia has never been investigated in hypertensive individuals with a history of SARS-CoV2. The aim of the study was to investigate the effect of fatigue, sleep, physical activity and, kinesiophobia in individuals with hypertension with and without a history of SARS-CoV2.

MATERIALS and METHODS

An assessor-blinded cross-sectional study was carried out in the Ege University internal medicine department with a total of 99 people with hypertension, including 53 of them with SARS-CoV2 disease history. The inclusion criteria of the study were; (1) 18 to 74 years old, (2) receiving antihypertensive therapy for at least 6 months, and (3) speaking Turkish. Patients who had severe psychiatric, somatic, cardiac, and pulmonary disorders were excluded from the study. Individuals aged 64 to 74 years (22) were included in the study to exclude age-related fatigue and muscle strength loss (23, 24).

Procedure

"The internist invited the people with hypertension who applied to the internal medicine department to the study. A face-to-face questionnaire was applied to individuals who agreed to participate in the study. The study was carried out in accordance with the ethical principles and the Helsinki Declaration. Informed consent of the patients was obtained. The study protocol was approved by the ethics committee of Ege University (No: 21-7T/33)."

Study outcomes

Information on patients ("e.g., age, gender, BMI, hypertension duration, other chronic diseases") with hypertension were recorded (Table 1). Patients were evaluated with the "International Physical Activity Questionnaire Short Form (IPAQ-SF), Fatigue Severity Scale (FSS), Tampa Scale of Kinesiophobia for Heart (TSK Heart), and Pittsburgh Sleep Quality Index (PSQI)".

"International Physical Activity Questionnaire Short Form (IPAQ-SF)"

Saglam et al. adapted the Turkish version of the IPAQ-SF. It consists of 7 items to question the physical activity status of the individuals (25).

"Fatigue Severity Scale (FSS)"

The FSS contains 9 items. The total score is calculated by the arithmetic average of all questions. A higher generally indicates higher fatigue (26). Turkish validation was conducted by Armutlu et al. (27).

"Tampa Scale of Kinesiophobia for Heart (TSK Heart)"

"Acar et al. adapted the Turkish version of the TSK Heart. It comprises 17 items that evaluate the subjective rating of kinesiophobia in terms related to cardiac conditions. The items are rated on a four-point Likert scale. Four states (4, 8, 11, and 12) are reverse coded, the higher values indicating more severe kinesiophobia (28)."

"Pittsburgh Sleep Quality Index (PSQI)"

"The PSQI is a standardized questionnaire consist of 19 items to assist in measuring sleep quality. It generates seven component scores, ranging from subscale scores 0 to 3: sleep quality, sleep latency, and sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medications and, daytime dysfunction. The addition of these seven components yields a total score. The higher score is indicative of poorer subjective sleep quality. The Turkish version was administered by Agargün et al. (29)."

Sample size

"The power analysis of the research was carried out with the G-Power 3 computer application (30). Since reference values of a similar study were not available, Cohen's d was used to determine the effect size value (31). Assuming the medium effect size value of 0.50, a total of 34 patients were estimated to be sufficient with 95% power and 95% confidence level for each group."

Statistical analysis

"SPSS software for Windows v26.0 (Statistical Package for Social Sciences) was used to analyze datasets (SPSS Inc, IBM Corp, Armonk, New York). Mean ± standard deviation (SD) and percentage (%) were given for the variables. The statistical significance level was preferred as 0.05. "Shapiro-Wilk test" and "Histogram" were used to show the normality of the variables. The "Mann-Whitney U test" was used to compare case group differences, as all variables did not conform to normality. In addition, "Pearson's chi-square" and "Spearman's correlation" analyses were used."

RESULTS

A total of 99 people with hypertension (57.98±9.63 years, 76 women, 23 men) were enrolled in the study. The mean ages of the SARS-CoV2 positive and negative people with hypertension were 56.71±9.82 and 59.46±9.29, respectively. The physical and clinical features of our two case groups were similar. Cases with or

without COVID-19 were significantly comparable in terms of age, gender, BMI, hypertension duration, and other chronic disease history (Table-1).

People with hypertension in the SARS-CoV2 positive group had a significantly higher "moderate physical activity (PA) sub score" of the "IPAQ (Metabolic Equivalent of Task (MET) minutes per week)" (p=0.014). However, there was no significant difference between "SARS-CoV2 positive and negative patients" in "IPAQ-Total score", "sitting physical activity (PA)", "walking PA", and "vigorous PA" sub scores of the IPAQ (p>0.05). Besides, the FSS scores of "SARS-CoV2" positive patients were significantly higher (p = 0.019). On the other hand, there was no significant difference between patients with and without "SARS-CoV2" in terms of "TSK Heart" and "PSQI" scores (p>0.05) (Table-2) (Figure-1).

Table-1. The baseline physical and clinical characteristics of the patients.

	COVID-19 positive cases (n = 53)	COVID-19 negative cases (n = 46)	p
Age (years. mean ± SD)	56.71 ± 9.82	59.46 ± 9.29	0.173[a]
Gender (women/men. %)	73.6/26.4	80.4/19.6	0.421[b]
BMI (kg/m^2. mean± SD)	28.0 ± 3.93	27.91 ± 1.96	0.214[b]
HTN durations (years. mean ± SD)	4.16 ± 3.86	4.78 ± 4.08	0.456[b]
Other chronic diseases (yes/no. %)	73.6/26.4	78.3/21.7	0.588[a]

"SD: standard deviation, n: number of patients, HTN: Hypertension, BMI: Body Mass Index, a: Mann–Whitney U test, b: Pearson Chi Square test."

Table-2. The comparison of the scores between the groups.

	COVID-19 positive cases (n = 53)	COVID-19 negative cases (n = 46)	p
IPAQ – Total (MET min week – 1)	1036.16 ± 384.04	901.2 ± 280.5	0.139
Sitting PA (MET min week – 1)	495.0 ± 136.317	456.65 ± 219.13	0.719
Walking PA (MET min week – 1)	441.14 ± 301.48	431.51 ± 294.99	0.877
Moderate PA (MET min week – 1)	80.75 ± 168.84	13.04 ± 63.13	0.014*
Vigorous PA (MET min week – 1)	9.05 ± 33.86	0.0 ± 0.0	0.058
FSS	4.78 ± 1.18	4.1 ± 1.29	0.019*
TSK Heart	41.67 ± 5.73	41.93 ± 4.69	0.298
PSQI	8.22 ± 2.51	7.53 ± 2.3	0.176

"SD: standard deviation, n: number of patients, HTN: Hypertension, IPAQ: International Physical Activity Questionnaire-Short Form, MET: Metabolic equivalent, PA: Physical activity, FSS: Fatigue Severity Scale, TSK: Tampa Scale of Kinesiophobia for Heart, PSQI: The Pittsburgh Sleep Quality Index, *: p< 0.05"

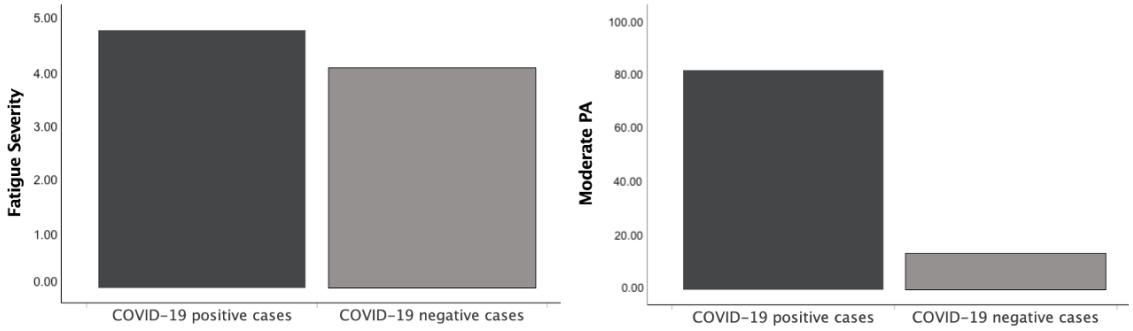

Figure-1. Comparison of fatigue and moderate PA in COVID-19 positive cases.

Table-3. The comparison of physical and clinical characteristics with PA in positive cases.

n: 53	Sitting PA	Walking PA	Moderate PA	Vigorous PA	IPAQ- Total
Age	0.253	-0.102	-0.113	-0.195	-0.051
BMI	-0.005	-0.006	0.068	0.019	-0.010
HTN duration	0.157	0.209	-0.175	0.043	0.139
FSS	0.071	-0.221	-0.055	-0.070	-0.239
TSK Heart	0.084	-0.237	-0.394*	-0.177	-0.436*
PSQI	0.017	-0.133	0.053	0.070	-0.107

"n: number of patients, HTN: Hypertension, BMI: Body Mass Index, IPAQ: International Physical Activity Questionnaire-Short Form, MET: Metabolic equivalent, PA: Physical activity, FSS: Fatigue Severity Scale, TSK: Tampa Scale of Kinesiophobia for Heart, PSQI: The Pittsburgh Sleep Quality Index, *: p< 0.01"

Table-4. The relationship of significant scores with other parameters in positive cases.

n: 53	FSS	TSK Heart	PSQI
Age	0.439*	0.454*	0.284
BMI	0.038	0.025	-0.054
HTN duration	0.094	0.170	0.188
FSS	n/a	0.575*	0.654*
TSK Heart	0.575*	n/a	0.249
PSQI	0.654*	0.249	n/a

"n: number of patients, HTN: Hypertension, BMI: Body Mass Index, IPAQ: International Physical Activity Questionnaire-Short Form, MET: Metabolic equivalent, PA: Physical activity, FSS: Fatigue Severity Scale, TSK: Tampa Scale of Kinesiophobia for Heart, PSQI: The Pittsburgh Sleep Quality Index, *: p< 0.01"

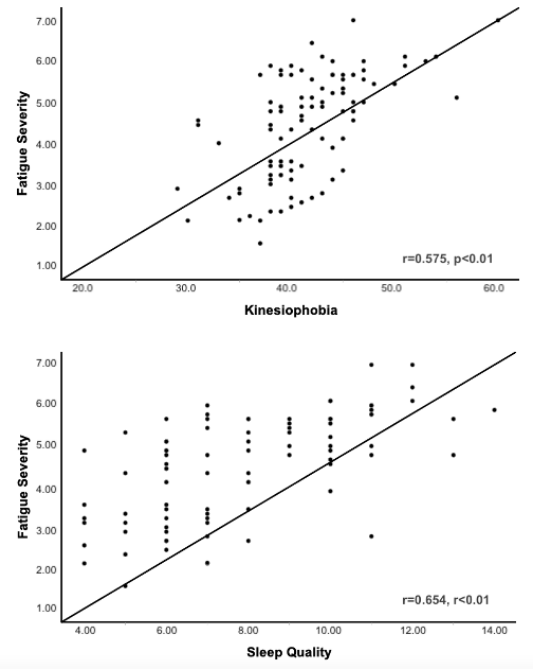

Figure-2. Scatter plot between FSS with TSK Heart and PSQI

The relationship of significant scores with physical and clinical characteristics, "IPAQ, FSS, TSK and PSQI" in people with hypertension with "SARS-CoV2" was presented in (Table-3). TSK Heart was moderately correlated with the "moderate PA sub score" of the "IPAQ and IPAQ-Total score" (r_1=-0.394, r_2=-0.436, respectively). On the other hand, age was moderately correlated with "FSS and TSK heart" (r_1=0.439, r_2=0.454, respectively). Moreover, "FSS" was moderately associated with "TSK Heart and PSQI" (r_1=0.575, r_2=0.654, respectively) (Table-4) (Figure-2).

DISCUSSION

The present study aimed to investigate the effect of SARS-CoV2 disease on fatigue, sleep, physical activity, and kinesiophobia in individuals with systemic hypertension. It was also purposed to reveal the relationship of these essential parameters with each other. According to the results of the study, SARS-CoV2 was found to be responsible for fatigue in people with hypertension. Kinesiophobia was related with both total and moderate PA in SARS-CoV2 positive hypertension patients. Besides, fatigue was correlated with kinesiophobia and sleep quality.

It is already comprehended that increases in blood pressure in individuals with hypertension

may be associated with chronic fatigue syndrome. Irregular systolic and diastolic blood pressure changes cause individuals with hypertension to get tired more quickly (32). In addition, it is assumed that there may be mental fatigue due to an increase in anxiety and depression in individuals with hypertension (33). According to our results, it was revealed that SARS-CoV2 positive individuals were more tired than negative cases. It has been debated that SARS-CoV2 may cause chronic fatigue syndrome in different samples. It is also emphasized that one of the symptoms of long COVID may be chronic fatigue (34). The long-term effects on the olfactory sensory nerve in the central nervous system were stated to induce chronic fatigue (35). According to the results we obtained in our study, it was demonstrated that individuals in the hypertension group, who were already prone to fatigue, were more tired. Since it is comprehended that different variants of SARS-CoV2 cause different symptoms, long-term follow-up in patients with hypertension may reveal case-control studies on why SARS-CoV2 increases fatigue in individuals with hypertension (36). In addition, considering that SARS-CoV2 may increase chronic fatigue in the long term in rehabilitating individuals with hypertension in the clinic, it can be deduced that it would be beneficial to manage exercise sessions.

In extensive cohort studies, it has been shown that people's physical activity levels decrease during the quarantine period. It is understood that individuals stay away from common aerobic activities such as walking or jogging, which are considered moderate PA (37, 38). Due to the effects on psychosomatic parameters such as fatigue or kinesiophobia, patients with hypertension began to lead a more sedentary life during this pandemic period. In particular, individuals with a history of SARS-CoV2 negative may have tended to raise their fears of movement to a higher level due to the fear of coronaphobia. In this respect, moderate PA levels of SARS-CoV2 positive individuals were higher in our study. Since COVID-19 positive individuals have relatively overcome their coronaphobia, they may have turned to moderate PA to give more importance to healthy living after illness or improve their psychological state with physical activity. Encouraging patients to engage in physical activity, considering their fatigue status, can provide an essential preventive rehabilitation approach to control blood pressure and other related symptoms. Since even longer-term symptoms of the post-viral picture are not known yet, enabling patients to reach their pre-pandemic stages, especially in moderate PA, may provide more effective clinical outcomes.

Our study examined the clinical status of positive cases with hypertension in more detail by observing the relationship between clinical measurement results. Fatigue was associated with sleep quality and, kinesiophobia in SARS-CoV2 positive cases with hypertension. Individuals may tend to move less because of possible chronic fatigue syndrome. On the other hand, the negative effect of fatigue on sleep quality is also known. In addition, it is already comprehended that SARS-CoV2 can directly reduce the quality of sleep, and individuals' sleep time is shortened (39). In this respect, studies in which fatigue, sleep quality, fear of movement and other psycho-social parameters are analyzed in a causal relationship in larger samples may reveal these relationships in more detail.

Kinesiophobia has been a subject of interest in many previous studies on heart and related diseases (28). However, with the decrease in physical activity during the pandemic period, the interest in fear of movement has increased. Predominantly people with chronic diseases and elderly individuals are exposed to quarantine even longer during quarantine periods (40). Therefore, Tampa TSK was applied to individuals, estimating that they became afraid to act due to legal obstacles and the fear of being exposed to the SARS-CoV2. Due to the nature of the questionnaire, the results of this questionnaire, which can only be applied to individuals with cardiac and related symptoms, can only be considered in the comparative analysis of positive cases. According to the results of our study, kinesiophobia was found to be associated with both moderate and total PA. In particular, the observation that individuals deprived of moderate PA have a fear of movement, constructed us to assume that this sedentary lifestyle may not be just a legal obstacle. For instance, coronaphobia can be predicted as a reason that pushes them to fear movement (14, 35).

So far, there has been no study directly focusing on the effect of the SARS-CoV2 in individuals with systemic hypertension. Our study is unique in terms of its subject. In a single study conducted at the beginning of the pandemic,

physical activity was associated with psychological state and sleep quality in individuals with pulmonary hypertension (41). In our study, kinesiophobia, one of the critical indicators of psychological state, was also related to PA and psychological state in individuals with hypertension. However, in our study, PA was not associated with sleep quality. This inconsistency between results may be due to the different clinical features of the case groups.

Limitations

The limitations of the study should be emphasized. First, the hypertension patients were not evaluated by their disease stage (42). The disease severity might be an essential parameter, particularly in fatigue and sleep quality comparisons. Second, the physical activity level of the individuals was not assessed with an accelerometer or pedometer. Sensor-based evaluation would provide more objective data to demonstrate the actual activity status of the patients. Third, the regression analysis of the clinical measurements would provide more holistic data. However, our sample was relatively small to conduct the regression analysis in COVID-19 positive case with hypertension.

CONCLUSIONS

In conclusion, SARS-CoV2 was found to be responsible for fatigue in people with hypertension. In addition, kinesiophobia was related with both total and moderate PA in SARS-CoV2 positive cases with hypertension. Besides, fatigue was correlated with kinesiophobia and sleep quality. Further studies should investigate the physical and mental fatigue in detail. Also, hypertension patients should be guided about the importance of moderate PA, including aerobic exercise.

Conflict of interest: All authors state no competing financial.

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