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Özgün araştırma

Pandemi Sonrası Multipl Skleroz Hastalarında Neler Değişti? Yorgunluk, Fiziksel Aktivite, Uyku Kalitesi ve Anksiyete Düzeyleri

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Öz

Amaç: Bu çalışmanın amacı, COVID-19 salgını sırasında Multipl Sklerozlu (MS) hastalarda yorgunluk, fiziksel aktivite, uyku kalitesi ve anksiyete düzeylerini COVID-19 öncesine göre karşılaştırmaktı.
Gereç ve Yöntemler: Bu kesitsel çalışmada rutin olarak takip ettiğimiz 48 MS hastasına e-posta ile ulaşıldı. Katılımcılardan sosyodemografik veri formu, Yorgunluk Şiddet Ölçeği (YŞÖ), Uluslararası Fiziksel Aktivite Anketi (UFAA), Pittsburgh Uyku Kalitesi İndeksi (PUKİ) ve Hastane Anksiyete ve Depresyon Ölçeği'nin (HADÖ) anksiyete bölümünü içeren çevrimiçi bir anketi doldurmaları istendi. Ayrıca hastaların sosyal izolasyon süreleri ve bu dönemde kimlerle yaşadıkları kaydedildi. Çalışma Türkiye'de 5-15 Mayıs 2020 tarihleri arasında tamamlandı.
Bulgular: Yaşları 21-58 arasında olan 30 MS hastası çalışmaya katılmak için gönüllü oldu. COVID-19 pandemi döneminde fiziksel aktivite ve uyku kalitesinin azaldığını ve yorgunluğun arttığını bulduk ($p < 0,05$). Ancak anksiyete düzeyinde anlamlı fark bulunmadı ($p > 0,05$).
Sonuç: Kesitsel tipteki bu çalışmanın sonuçları, fiziksel aktivite, uyku kalitesi ve yorgunluğun pandemi öncesi değerlere göre daha olumsuz olduğunu, ancak anksiyete durumunda herhangi bir değişiklik olmadığını göstermektedir.

Anahtar kelimeler*: *COVID-19; Multipl Skleroz, fiziksel aktivite, anksiyete, yorgunluk

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Original Research

What has Changed in Patients with Multiple Sclerosis After the Pandemic? Fatigue, Physical Activity, Sleep Quality, and Anxiety Levels

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Abstract

Objective: The aim of this study was to compare the fatigue, physical activity, sleep quality, and anxiety levels in patients with Multiple Sclerosis (PwMS) during the outbreak of COVID-19 to pre-COVID-19 outbreak. **Material and Methods:** In this cross-sectional study, 48 MS patients, whom we routinely followed up, were contacted by e-mail. The participants were asked to complete an online survey that includes sociodemographic data form, the Fatigue Severity Scale (FSS), the International Physical Activity Questionnaire (IPAQ), the Pittsburgh Sleep Quality Index (PSQI), and the anxiety part of the Hospital Anxiety and Depression Scale (HADS). Also, the patients' social isolation time and with whom they lived during this period were recorded. The study was completed between May 5 and 15, 2020 in Turkey.
Results: Thirty PwMS, aged 21-58 years, volunteered to participate in the study. We found that physical activity and sleep quality decreased and fatigue increased in the COVID-19 pandemic period ($p<0.05$). However, no significant difference was found in the level of anxiety ($p>0.05$).
Conclusion: The results of this study suggest that physical activity, sleep quality, and fatigue were more negatively compared to the pre-pandemic values, but no change was observed in anxiety status.

Keywords: *COVID-19; Multiple Sclerosis, physical activity, anxiety, fatigue*

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Introduction

Multiple Sclerosis is an inflammatory, demyelinating and chronic disease of the central nervous system. Fatigue, decreased physical activity level, sleep disorders, and mood disorders (depression, anxiety) are observed in patients with Multiple Sclerosis (PwMS) (Hunter, 2016).

Fatigue is defined by patients as a feeling of extreme lack of energy, tiredness, or feeling exhausted. Fatigue is one of the most common (more than 85%) symptoms complained by PwMS, and its true origin is not fully understood. Some PwMS talk about constant fatigue and fatigue is one of the symptoms that some PwMS complain about after exertion, and it is not always possible to separate this situation from weakness. Fatigue may lead to increased disability and loss of rehabilitation gains. In addition, problems of employment, socialization, adaptation to illness and daily life activities can be seen due to fatigue (Braley and Chervin, 2010; Fisk et al., 1994). The average level of physical activity in PwMS at the earliest stages of the disease has been shown to be reduced compared with normal individuals. Ng and Kent-Braun showed that PwMS were less physically active than sedentary and active controls according to the accelerometer data (Ng and Knet-Braun, 1997). Sleep disorders are also observed more frequently in PwMS than in healthy individuals. Sleep disturbances are observed in 25-54% of PwMS. Considering the potential effect of sleep disorders on quality of life and health in PwMS, it deserves more attention. It can contribute to fatigue, pain, and depression which are common in PwMS and often cause disability (Brass, Duquette, Proulx-Therrien and Sanford, 2010). In addition, anxiety and depression are common and elevated in PwMS compared with the healthy individuals. Anxiety are observed in %15.8-57 of PwMS. Anxiety is a common, unpleasant, and vague prescience of negativity. Anxiety has been shown to be related with reduced life quality, cognitive function impairments, employment problems, and suicide risk in PwMS (Boeschoten et al., 2017; Feinstein, Magalhaes, Richard, Audet and Moore, 2014). Increased level of fatigue and anxiety level and decreased physical activity level and sleep quality are closely related and tend to cluster together in PwMS. Therefore, we think that these parameters will be affected together (Rooney, Wood, Moffat and Paul, 2019; Rzepka, Toś, Boroń, Gibas and Krzystanek, 2020).

In December 2019, an infectious disease caused by the newly discovered form of coronavirus known as SARSCoV-2 occurred in Wuhan, China. This disease was defined coronavirus disease 2019 (COVID-19) by the World Health Organization. Just like other members of society, PwMS are uncomfortable with the health anxiety and emotional discomfort

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caused by the outbreak of COVID-19 (World Health Organization, 2020; Zhu et al., 2020). Most PwMS take immunosuppressive or immunomodulatory therapies. PwMS receiving immunosuppressive agent therapy are theoretically at higher risk of contracting viral pandemics and a higher health concern is expected. In addition, PwMS can lose social support. In addition, PwMS with prolonged home stay cannot access cognitive and physical rehabilitation treatments. Because of all these reasons, we think that fatigue, physical activity, sleep quality, and anxiety levels will be affected more in PwMS.

Therefore, the objective of this study was to compare the fatigue, physical activity, sleep quality, and anxiety levels during the outbreak of COVID-19 in PwMS compared to the pre-pandemic values. The hypothesis of the study was that fatigue and anxiety levels increased, and physical activity and sleep quality levels decreased in PwMS during the outbreak of COVID-19 compared to the pre-pandemic values.

Material and Methods

Sample size calculation

Since no reference data were available for such a comparison in PwMS, physical activity pre-assessment data were used to calculate the sample size and power. For 5% Type I error, 90% power, and 0.62 standard effect size, it was calculated that at least 24 participants were needed.

Study design

This cross-sectional study was conducted through the Google Forms web survey platform (Google LLC, Mountain View, CA, USA). The participants, whose personal email addresses were available and who had given consent to its use to receive information about initiatives taken by Ankara Yıldırım Beyazıt University Physiotherapy and Rehabilitation Department, were contacted. All participants completed the online survey, which was previously administered at study enrollment (baseline), to assessment changes in fatigue, physical activity, sleep quality, and anxiety during the pandemic period. We assessed the effects of the COVID-19 outbreak on fatigue, physical activity, sleep quality, and anxiety among PwMS via an online survey. Also, the patients' social isolation time and with whom they lived with this period were recorded. The questionnaire, which could have been filled in using mobile phones, tablets, or desktop computers, took approximately 10 minutes to complete. The online

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survey was completed between May 5 and 15, 2020 in Turkey during the pandemic. All assessments were applied once. In the same evaluation, fatigue, physical activity, sleep quality and anxiety levels were evaluated both before and during the pandemic.

Participants

Eligible participants included a total of 30 PwMS aged between 18 and 65 years. Patients with a physician-confirmed clinical diagnosis of MS and an Expanded Disability Status Scale (EDSS) range of 1-5, and being were able to follow instructions were included. Patients who had an acute attack (three months before the study) and those who received a therapy program during the COVID-19 outbreak were excluded. Informed consent was obtained electronically before the data were collected. Written permission was obtained from the Ethics Committee (Approval number: E.16554). The study with protocol number NCT04438954 was registered at http://clinicaltrials.gov. Informed consent was obtained with an online form in the study conducted according to the Helsinki Declaration.

Outcomes measures

Fatigue: Fatigue Severity Scale (FSS), consisting of 9 items, was used to evaluate the effects of fatigue on daily life. Each item is scored between 1 and 7, and a score of 4 or higher indicates severe fatigue (Armutlu et al., 2007; Krupp, Larocca, Muir-Nash and Steinberg, 1989).

Physical activity: The short form of the The International Physical Activity Questionnaire (IPAQ) consists of seven items and provides data regarding the time allocated to walking, sitting, moderately vigorous activities, and vigorous activities. The total score calculation of the short form includes the total duration (minutes) and frequency (days) of all these three activities (Craig et al., 2003). It is classified as being physically inactive (<600 MET-min/week), low levels of physical activity (600-3000 MET-min/week), and adequate physical activity (>3000 MET-min/week).

Sleep Quality: The Pittsburgh Sleep Quality Index (PSQI), which includes sleep duration, quality, disturbance, latency, habitual sleep efficiency, use of sleeping medications, and daytime dysfunction was used. If the participant's score is 5 or <5, it is classified as "good sleep quality", and >5 as "poor sleep quality". (Ağargün, Kara and Anlar, 1996; Buysse, Reynolds, Monk, Berman and Kupfer, 1989)

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Anxiety: The anxiety section of the Hospital Anxiety and Depression Scale (HADS), which consists of two sections, anxiety and depression, was used. Each item of the scale is scored between 0 and 3, and the total score varies between 0 and 21. A participant's score of 8 or higher on the scale indicates anxiety. (Aydemir, 1997; Honarmand and Feinstein, 2009).

Statistical analysis

Statistical analysis was performed using SPSS 15.0 (SPSS Inc., Chicago, IL, USA). Normal distribution of the variables was examined via analytical (Shapiro-Wilk test) and visual methods (probability plots and histograms). For all variables, descriptive statistics were calculated. Independent samples t-test was used to compare measurement results of normally distributed variables and Wilcoxon test was used to compare measurement results of non-normally distributed variables. The current analysis focus on the data collected via the baseline online survey and during the COVID-19 pandemic. Statistical significance was determined as alpha <0.05.

Results

48 PwMS with contact information were invited to the study, 10 PwMS did not return to e-mail and 8 PwMS did not meet the inclusion criteria (acute attack). The study was completed with 30 PwMS, aged 21-58 years. The sociodemographic and clinical features of the patients are displayed in Table 1. Fatigue, physical activity, sleep quality, and anxiety results are presented in Table 2.

We found that fatigue increased and physical activity and sleep quality decreased during the COVID-19 pandemic period ($p<0.05$, respectively). However, no significant difference was found in the level of anxiety ($p>0.05$). According to the IPAQ results, before the COVID-19 pandemic period, 20 PwMS had a low level of physical activity, 7 had a moderate level of physical activity, and 3 had a high level of physical activity. In the COVID-19 pandemic period, 27 PwMS had a low level of physical activity and 3 had a moderate level of physical activity.

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Table 1. Sociodemographic and clinical features of the PwMS

		Median (Min-Max)
Age, years		36 (21-58)
BMI, kg/m²		24.65 (17.40-43)
EDSS, score		2.5 (1-4)
		n (%)
Gender	**Male**	10 (33.3)
	Female	20 (66.7)
Marital status	**Unmarried**	10 (33.3)
	Married	17 (56.7)
	Divorced or widow	3 (10)
Education	**High school or below**	10 (33.3)
	University or college	17 (56.7)
	Postgraduate or above	3 (10)
Occupational status	**Student**	1 (3.3)
	Civil servant	7 (23.3)
	Worker	4 (13.3)
	Retired	3 (10)
	Housewife	8 (26.7)
	Unemployed	4 (13.3)
	Other (working from home)	3 (10)
Homeplace	**Rural**	1 (3.3)
	Urban	29 (96.7)
With whom he/she lives	**Single**	1 (3.3)
	With family	29 (96.7)
Relatives diagnosed with Covid-19	**Yes**	0
	No	30 (100)
Isolation duration	**Since the first case diagnosis**	12 (40)
	On certain days of the week	8 (26.7)
	For about two months	8 (26.7)
	I am not in isolation	2 (6.7)
Depression medication use	**Yes**	4 (13.3)
	No	26 (86.7)
Immunomodulator use	**No**	4 (13.3)
	Injectable medications	8 (26.7)
	Oral medications	13 (43.3)
	Infused medications	5 (16.7)

BMI: Body Mass Index; EDSS: Expanded Disability Status Scale; Min: minimum; Max: maximum

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Table 2. Comparison of participants' fatigue, physical activity, anxiety, and sleep quality levels during the COVID-19 outbreak compared to pre-pandemic values

	Pre-pandemic period (n=32)		**COVID-19 pandemic period (n=32)**		**p**
	Median (IQR)	**Min- Max**	**Median (IQR)**	**Min- Max**	
FSS (score)	4.90 (4-5.60)	2.10-7	5.15 (4.40-6.10)	2-7	**0.015**
IPAQ					
Total PA (MET-min/week)	483 (198-930)	0-2010	198 (0-438)	0-1290	**<0.001**
Sitting time (min.)	6 (4-8)	2-14	8 (6-12)	3-19	**<0.001**
HADS (score)	7 (4-10)	1-17	7.5 (5-11)	1-18	0.283
	X	**SD**	**X**	**SD**	**p**
PSQI (score)	6.37	3.03	8.23	4.50	**0.001**

p<0.05; FSS: Fatigue Severity Scale; IPAQ: International Physical Activity Questionnaires; PSQI: Pittsburgh Sleep Quality Index; HADS: Hospital Anxiety and Depression Scale; PA: Physical Activity MET: Metabolic Equivalent of Task; min: minute; SD: Standard deviation; IQR: Interquartile Range; Min: Minimum; Max: Maximum

Discussion

We conducted the present study to determine the potential effects of the COVID-19 pandemic on PwMS, and found that while perception of fatigue, physical activity, and sleep quality were affected by the pandemic period, no change was observed in anxiety levels. COVID-19 increased fatigue perception and decreased the physical activity and sleep quality in PwMS compared to the pre-pandemic values. This suggests that, PwMS have negatively been affected by the pandemic to a certain extent.

Among all the problems related with MS, fatigue is expressed as the most frequently reported symptom that increases the disability level most in PwMS. In clinical trials conducted so far, various mechanisms related to the physical inactivity and the disease have been asserted to contribute to fatigue level (Booth, Roberts and Laye, 2012; Braley and Chervin, 2010). Many studies have clearly demonstrated that exercise therapy can reduce the fatigue of patients with its physiological and psychological benefits (Heine, van de Port, Rietberg, van Wegen and Kwakkel, 2015; Safari, Van der Linden and Mercer, 2017). While the fatigue seen in PwMS is generally associated with the inability to maintain repetitive activities in daily life, the fatigue reported by the patients in our study was substantially related to the deconditioning state caused by the decreased physical activity level (Fisk et. al., 1994). Authorities managing the pandemic

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process have recommended that chronic patients, such as PwMS, should not leave the house except for emergencies. This situation led to the limitation of physical activities in general in PwMS. We think that this situation also may increase fatigue in PwMS. Likewise, it has been shown in the literature that physical activity and fatigue are related each other (Rzepka, Toś, Boroń, Gibas and Krzystanek, 2020). In addition, Kotterba et al. (2018) investigated fatigue, and sleep quality in PwMS, and found that the perception of fatigue was significantly related with poor sleep quality (Kotterba, 2018). Besides that our study revealed that the perception of fatigue and sleep quality symptoms were both affected during the pandemic process together, which may indicate that the cycle of sleep quality and fatigue can be affected by any one of them may change the other.

Since MS mainly affects the nervous system, which is the main component of the locomotor mechanism, it is inevitable that the physical activity levels of the affected PwMS progressively reduce depending on the severity of the disease. Therefore, most of the physiotherapy programs administered in these patients in clinics aim to maintain the current physical activity level or slow down the progression of the deterioration (Motl et al., 2017; Rooney, Albalawi and Paul, 2020). Currently, the pandemic control process all over the world is carried out with the 'stay home' slogan, which basically may cause physical inactivity. Considering that it causes a decrease in the level of physical activity even in healthy people; it is unavoidable that PwMS, who are already at a disadvantage in terms of physical health, will be greatly affected by this process (Pinto, Dunstan, Owen, Bonfá and Gualano, 2020). As a matter of fact, the results of our study revealed that the physical activity of PwMS decreased during the pandemic process.

Numerous studies, especially in the MS literature suggest that sleep-related problems may be the greatest cause in the perception of fatigue in PwMS, which indicates the importance of level and duration of fatigue, and their effect on all aspects of life in PwMS (Côté et al. 2013; Kaynak et al 2006; Moreira et al. 2008). Sadeghi Bahmani et al. (2019) reported that performing regular exercises improved the fatigue, sleep quality, and depression in PwMS (Sadeghi Bahmani et al., 2019). In other words, the reduction in the level of physical activity may cause the sleep quality to deteriorate and the perception of fatigue to increase. As shown in our study, as the pandemic process makes patients less physically active, the fatigue perception and sleep quality of the patients deteriorate.

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Since the beginning of the pandemic, negative predictions related to disease on TV, the death and new case statistics announced every day, and the calls to stay home have caused fear and anxiety in general public. Generally, high levels of general stress, disability, and low self-efficacy have been reported to be risk factors of anxiety in PwMS (Riether, 1999). Also, among those most physiologically affected by COVID-19 are those with a co-existing chronic illness (Ozamiz-Etxebarria, Dosil-Santamaria, Picaza-Gorrochategui and Nahia Idoiaga, 2020; Özdin and Özdin, 2020). So, the negative physiological effects of the pandemic are normally expected to be much more common in people with chronic diseases such as MS. However, the results of our study are insufficient to demonstrate this outcome. Studies on the effects of the pandemic on PwMS have mostly examined the anxiety and depression states of the patients, but the results are surprisingly different (Chiaravalloti et al., 2020; Stojanov et al., 2020). Stojanov et al. stated that anxiety levels increased in PwMS during the pandemic period, although there was no change in depression levels (Stojanov et al., 2020). Chiaravalloti et. al. stated that in a sizable sample of individuals with PwMS in six different countries, no significant change in anxiety level was noted from baseline to lockdown (Chiaravalloti et al., 2020). In another study conducted in our country, Özkeskin et al showed that COVID-19 disease did not affect the anxiety levels in PwMS (Özkeskin, Özden, Karaman, Ekmekçi and Yüceyar, 2021). Our results showed that there was no significant change in the anxiety level of the PwMS during the pandemic period, in line with the results of current literature (Chiaravalloti et al., 2020; Özkeskin, Özden, Karaman, Ekmekçi and Yüceyar, 2021). The post-pandemic evaluations of our study were conducted within the third month following the onset of the pandemic. Forty percent of the patients in our study were in social isolation from the time the first case was diagnosed. In addition, 96% of the patients in our study were living with their families and spending time with family members in a restrictive period, which is very valuable in Turkish culture and may have positively affected the psychological status of the patients. Despite the negative effects of the pandemic on the society, staying at home in the first days of the pandemic created a feeling of safety. Therefore, no increase in anxiety may have occurred in the patients in our study compared to the pre-pandemic period. If we had an additional evaluation in the later stages of the pandemic (after 8-10 months maybe), we could have seen an increase in fear or anxiety related to the uncertainty about how long the process would continue.

There are some limitations of our study. Prolonged monitoring of PwMS after the COVID-19 pandemic is necessary for a better understanding of the influence of the COVID-19

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pandemic on fatigue, physical activity, sleep quality, and anxiety levels. As the fact that the study was a survey study may cause the results to be subjective and patients may have difficulty remembering their pre-pandemic levels. In addition, the inability to make a more detailed evaluation according to gender, age and types of MS can be counted among the limitations. Considering these limitations of this study, more comprehensive results can be obtained with future studies planned accordingly. On the other hand, this study was performed in only PwMS with mild to moderate disability, and for that reason, it could give a better insight into the psychological status of this group. However, the study also has its strengths. While studies conducted in PwMS during the pandemic period mostly focused on psychological problems, in our study we evaluated parameters that affect each other reciprocally, such as physical activity, sleep, fatigue, and anxiety.

Conclusion

In conclusion, it was shown in our study that the COVID-19 pandemic has a significant impact on fatigue, physical activity, and sleep quality, but surprisingly it had no effect on anxiety status in PwMS with mild to moderate disability. In this case, it is important to know the effect of the pandemic period on fatigue, physical activity level and sleep quality in MS patients in order to take the necessary precautions. So, in the pandemic period, more detailed information should be provided as much as possible in chronic autoimmune diseases by health care professionals.

Disclosure Statement

No author has any financial interest or received any financial benefit from this research.

Conflict of Interest

The authors state no conflict of interest.

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References

Ağargün, Y. M., Kara, H., & Anlar, Ö. (1996) Pitsburg Uyku Kalitesi İndeksi'nin geçerliliği ve güvenirliği. *Türk Psikiyatri Dergisi*, *7*(2), 107-111.

Armutlu, K., Korkmaz, N. C., Keser, I., Sumbuloglu, V., Akbiyik, D. I., Guney, Z., et al. (2007). The validity and reliability of the Fatigue Severity Scale in Turkish multiple sclerosis patients. *International Journal of Rehabilitation Research, 30*(1), 81-85. https://doi.org/10.1097/MRR.0b013e3280146ec4

Aydemir, Ö. (1997). Hastane anksiyete ve depresyon ölçeği Türkçe formunun geçerlilik ve güvenilirliği. *Türk Psikiyatri Dergi*si, *8*, 187-280.

Boeschoten, R. E., Braamse, A. M., Beekman, A. T., Cuijpers, P., van Oppen, P., Dekker, J., et al. (2017). Prevalence of depression and anxiety in multiple sclerosis: a systematic review and meta-analysis. *Journal of the Neurological Sciences*, *372*, 331-341. https://doi.org/10.1016/j.jns.2016.11.067

Booth, F. W., Roberts, C. K., & Laye, M. J. (2011). Lack of exercise is a major cause of chronic diseases. *Comprehensive Physiology*, *2*(2), 1143-1211. https://doi.org/10.1002/cphy.c110025

Braley, T. J., & Chervin, R. D. (2010). Fatigue in multiple sclerosis: mechanisms, evaluation, and treatment. *Sleep*, *33*(8), 1061-1067. https://doi.org/10.1093/sleep/33.8.1061

Brass, S. D., Duquette, P., Proulx-Therrien, J., & Auerbach, S. (2010). Sleep disorders in patients with multiple sclerosis. *Sleep Medicine Reviews*, *14*(2), 121-129. https://doi.org/10.1016/j.smrv.2009.07.005

Buysse, D. J., Reynolds III, C. F., Monk, T. H., Berman, S. R., & Kupfer, D. J. (1989). The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. *Psychiatry Research*, *28*(2), 193-213. https://doi.org/10.1016/0165-1781(89)90047-4

Chiaravalloti, N. D., Amato, M. P., Brichetto, G., Chataway, J., Dalgas, U., DeLuca, J., et al. (2020). The emotional impact of the COVID-19 pandemic on individuals with progressive multiple sclerosis. *Journal of Neurology*, 1-10. https://doi.org/10.1007/s00415-020-10160-7

Côté, I., Trojan, D. A., Kaminska, M., Cardoso, M., Benedetti, A., Weiss, D., et al. (2013). Impact of sleep disorder treatment on fatigue in multiple sclerosis. *Multiple Sclerosis Journal*, *19*(4), 480-489. https://doi.org/10.1177/1352458512455958

Craig, C. L., Marshall, A. L., Sjöström, M., Bauman, A. E., Booth, M. L., Ainsworth, B. E., et al. (2003). International physical activity questionnaire: 12-country reliability and validity. *Medicine & Science in Sports & Exercise*, *35*(8), 1381-1395. https://doi.org/10.1249/01.MSS.0000078924.61453.FB

Feinstein, A., Magalhaes, S., Richard, J. F., Audet, B., & Moore, C. (2014). The link between multiple sclerosis and depression. *Nature Reviews Neurology*, *10*(9), 507. https://doi.org/10.1038/nrneurol.2014.139

Fisk, J. D., Ritvo, P. G., Ross, L., Haase, D. A., Marrie, T. J., & Schlech, W. F. (1994). Measuring the functional impact of fatigue: initial validation of the fatigue impact scale. *Clinical İnfectious Diseases*, *18* (supplement-1), 79-83. https://doi.org/10.1093/clinids/18.supplement_1.s79

Heine, M., van de Port, I., Rietberg, M. B., van Wegen, E. E., & Kwakkel, G. (2015). Exercise therapy for fatigue in multiple sclerosis. *Cochrane Database Of Systematic Reviews*, (9). https://doi.org/10.1002/14651858.CD009956.pub2

Honarmand, K., & Feinstein, A. (2009). Validation of the hospital anxiety and depression scale for use with multiple sclerosis patients. *Multiple Sclerosis Journal*, *15*(12), 1518-1524. https://doi.org/10.1177/1352458509347150

H.Ü. Sağlık Bilimleri Fakültesi Dergisi
Cilt: 8, No: 3, 2021
doi: 10.21020/husbfd.884214

Hunter, S. F. (2016). Overview and diagnosis of multiple sclerosis. *The American Journal of Managed Care*, *22*(6 suppl), 141-150. PMID: 27356023

Kaynak, H., Altintaş, A., Kaynak, D., Uyanik, Ö., Saip, S., Ağaoğlu, J., Onder, G., et al. (2006). Fatigue and sleep disturbance in multiple sclerosis. *European Journal of Neurology*, *13*(12), 1333-1339. https://doi.org/10.1111/j.1468-1331.2006.01499.x

Kotterba, S., Neusser, T., Norenberg, C., Bussfeld, P., Glaser, T., Dörner, M., et al. (2018). Sleep quality, daytime sleepiness, fatigue, and quality of life in patients with multiple sclerosis treated with interferon beta-1b: results from a prospective observational cohort study. *BMC Neurology*, *18*(1), 1-10. https://doi.org/ 10.1186/s12883-018-1113-5

Krupp, L. B., LaRocca, N. G., Muir-Nash, J., & Steinberg, A. D. (1989). The fatigue severity scale: application to patients with multiple sclerosis and systemic lupus erythematosus. *Archives of Neurology*, *46*(10), 1121-1123. https://doi.org/10.1001/archneur.1989.00520460115022

Moreira, N. C. V., Damasceno, R. S., Medeiros, C. A. M., De Bruin, P. F. C., Teixeira, C. A. C., Horta, W. G., et al. (2008). Restless leg syndrome, sleep quality and fatigue in multiple sclerosis patients. *Brazilian Journal of Medical and Biological Research*, *41*, 932-937. https://doi.org/10.1590/S0100-879X2008001000017

Motl, R. W., Sandroff, B. M., Kwakkel, G., Dalgas, U., Feinstein, A., Heesen, C., et al. (2017). Exercise in patients with multiple sclerosis. *The Lancet Neurology*, *16*(10), 848-856. https://doi.org/10.1016/S1474-4422(17)30281-8

Ng, A. V., & Kent-Braun, J. A. (1997). Quantitation of lower physical activity in persons with multiple sclerosis. *Medicine and Science in Sports and Exercise*, *29*(4), 517-523. https://doi.org/10.1097/00005768-199704000-00014

Ozamiz-Etxebarria, N., Dosil-Santamaria, M., Picaza-Gorrochategui, M., & Idoiaga-Mondragon, N. (2020). Stress, anxiety, and depression levels in the initial stage of the COVID-19 outbreak in a population sample in the northern Spain. *Cadernos de Saude Publica*, *36*, e00054020. https://doi.org/10.1590/0102-311X00054020

Özdin, S., & Bayrak Özdin, Ş. (2020). Levels and predictors of anxiety, depression and health anxiety during COVID-19 pandemic in Turkish society: The importance of gender. *International Journal of Social Psychiatry*, *66*(5), 504-511. https://doi.org/10.1177/0020764020927051

Özkeskin, M., Özden, F., Karaman, B., Ekmekçi, Ö., & Yüceyar, N. (2021). The comparison of fatigue, sleep quality, physical activity, quality of life, and psychological status in multiple sclerosis patients with or without COVID-19. *Multiple Sclerosis and Related Disorders*, *55*, 103180. https://doi.org/10.1016/j.msard.2021.103180

Pinto, A. J., Dunstan, D. W., Owen, N., Bonfá, E., & Gualano, B. (2020). Combating physical inactivity during the COVID-19 pandemic. *Nature Reviews Rheumatology*, *16*(7), 347-348. https://doi.org/10.1038/s41584-020-0427-z

Riether, A. M. (1999). Anxiety in patients with multiple sclerosis. In Seminars in clinical neuropsychiatry. *4*(2), 103-113. https://doi.org/ 10.1053/scnp00400103

Rooney, S., Albalawi, H., & Paul, L. (2020). Exercise in the management of multiple sclerosis relapses: current evidence and future perspectives. *Neurodegenerative Disease Management*, *10*(2), 99-111. https://doi.org/10.2217/nmt-2019-0029

Rooney, S., Wood, L., Moffat, F., & Paul, L. (2019). Prevalence of fatigue and its association with clinical features in progressive and non-progressive forms of Multiple Sclerosis. *Multiple Sclerosis and Related Disorders*, *28*, 276-282. https://doi.org/10.1016/j.msard.2019.01.011

H.Ü. Sağlık Bilimleri Fakültesi Dergisi
Cilt: 8, No: 3, 2021
doi: 10.21020/husbfd.884214

Rzepka, M., Toś, M., Boroń, M., Gibas, K., & Krzystanek, E. (2020). Relationship between Fatigue and Physical Activity in a Polish Cohort of Multiple Sclerosis Patients. *Medicina*, *56*(12), 726. https://doi.org/10.3390/medicina56120726

Sadeghi Bahmani, D., Kesselring, J., Papadimitriou, M., Bansi, J., Pühse, U., Gerber, M., et al. (2019). In patients with multiple sclerosis, both objective and subjective sleep, depression, fatigue, and paresthesia improved after 3 weeks of regular exercise. *Frontiers in Psychiatry*, *10*, 265. https://doi.org/10.3389/fpsyt.2019.00265

Safari, R., Van der Linden, M. L., & Mercer, T. H. (2017). Effect of exercise interventions on perceived fatigue in people with multiple sclerosis: synthesis of meta-analytic reviews. *Neurodegenerative Disease Management*, *7*(3), 219-230. https://doi.org/10.2217/nmt-2017-0009

Stojanov, A., Malobabic, M., Milosevic, V., Stojanov, J., Vojinovic, S., Stanojevic, G., et al. (2020). Psychological status of patients with relapsing-remitting multiple sclerosis during coronavirus disease-2019 outbreak. *Multiple Sclerosis and Related Disorders*, *45*, 102407. https://doi.org/10.1016/j.msard.2020.102407

World Health Organization. (2020). World Health Organization coronavirus disease (COVID-19) dashboard.

Zhu, N., Zhang, D., Wang, W., Li, X., Yang, B., Song, J., et al. (2020). A novel coronavirus from patients with pneumonia in China, 2019. *New England journal of Medicine*. 382(8), 727-733. https://doi.org/10.1056/NEJMoa2001017