Original Article

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The Relationship between the Hospital Discharging Duration of the Patients Diagnosed with COVID-19 who had Ambulatory and Inpatient Treatment and the Frequency of Their Physical Activity before COVID-19

COVID-19 Teşhisi Konan Ayakta ve Hastanede Yatarak Tedavi Gören Hastaların Hastaneden Taburcu Olma Süresi ile COVID-19 Öncesi Fiziksel Aktivite Sıklığı Arasındaki İlişki

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ABSTRACT

Objective: This study aims to evaluate the correlation between physical activity before pandemic and quarantine measures, hospitalization status and length of stay in patients infected with coronavirus disease-19 (COVID-19).

Methods: A total of 638 people participated in the study. Of the participants 47.8% (n=305) were female and 52.2% (n=333) were male. Chi-square test was used to determine whether or not there was a correlation between hospitalization status and hospitalization duration and other variables.

Results: It was found that there was no significant correlation between rates of hospitalization and gender ($p>0.05$). There was a significant correlation between the frequency of doing physical activity before COVID-19 and hospitalization status among patients diagnosed as having COVID-19 ($p<0.05$). As the number of days of being physically active decreased, the length of hospital stay increased. There was a significant correlation between the frequency of doing physical activity before COVID-19 and the duration of hospitalization in patients diagnosed as having COVID-19 ($p<0.05$). As the number of days of being physically active increased, the length of hospital stay decreased.

ÖZ

Amaç: Bu çalışma, koronavirüs hastalığı-19 (COVID-19) ile enfekte olan hastalarda pandemi ve karantina önlemleri öncesi fiziksel aktivite ile hastaneye yatış durumu ve yatış süresi arasındaki ilişkiyi değerlendirmeyi amaçlamaktadır.

Yöntemler: Araştırmaya toplam 638 kişi katıldı. Katılımcıların %47,8'i (n=305) kadın, %52,2'si (n=333) erkek idi. Hastanede yatış durumu ile hastanede yatış süresi ve diğer değişkenler arasında ilişki olup olmadığını belirlemek için ki-kare testi kullanıldı.

Bulgular: Hastaneye yatış oranları ile cinsiyet arasında anlamlı bir ilişki olmadığı saptandı ($p>0,05$). COVID-19 tanılı hastalarda COVID-19 öncesi fiziksel aktivite sıklığı ile hastanede yatış durumu arasında anlamlı bir ilişki vardı ($p<0,05$). Fiziksel olarak aktif olunan gün sayısı azaldıkça hastanede kalış süresi uzadı. COVID-19 tanılı hastalarda COVID-19 öncesi fiziksel aktivite sıklığı ile hastanede kalış süresi arasında anlamlı bir ilişki bulundu ($p<0,05$). Fiziksel olarak aktif olunan gün sayısı arttıkça hastanede kalış süresi azalmakta idi.

Sonuç: Sonuç olarak, COVID-19 pandemisi öncesinde fiziksel olarak aktif olmak, hastalık nedeniyle hastaneye yatışların

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ABSTRACT

Conclusion: Consequently, being physically active before the COVID-19 pandemic contributes to the prevention of hospitalization due to illness, shortening of hospitalization duration and a milder course of the disease.

Keywords: COVID-19, physical activity frequency, duration of hospitalization

ÖZ

önlenmesine, hastanede yatış süresinin kısalmasına ve hastalığın daha hafif seyretmesine katkı sağlamaktadır.

Anahtar Sözcükler: COVID-19, fiziksel aktivite sıklığı, hastanede yatma süresi

Introduction

Coronvirus disease-19 (COVID-19) has spread rapidly all over the world since the beginning of 2020. More than 531.550.610 million cases of COVID-19 have been reported worldwide and more than 6.302.982 people died as from confirmation of the first case (as of 9 June 2022) (1). In Turkey, the first patient was diagnosed on March 11, 2020, and as of July 12, 2022, the total number of patients was 15,180,444 and the number of deaths was 99,057 (2,3). In addition to the mortality rates associated with COVID-19, some adverse effects on physical and mental health such as increased anxiety, depression or stress during lockdown have been determined (4,5). It has been proven that this novel coronavirus causes severe symptoms of illness among people of all ages, but older adults with multiple morbidities are at highest risk for poor prognosis due to COVID-19 (6). Being physically active, promoting the individual and community health, and contributing to the social, cultural and economic development of all nations enable people to maintain their daily lives in safer and more comfortable environments. For this reason, it is aimed to prevent the increased sedentary lifestyle among adults and adolescents and to achieve a relative decrease of 15% in sedentary lifestyle by 2030 (7). Significant evidence shows that physical inactivity and sedentary behavior increase the risk of many chronic diseases and shorten life expectancy (8). Therefore, it is very important to maintain an active lifestyle at home during the pandemic and not to completely interrupt or change people's lifestyles for the health of the general population, especially for those with risk factors and the elderly. Regular physical activity is one of the most important activities for a healthy life. Regardless of their age, for all individuals, doing regular physical activity is equivalent to maintaining health. It is suggested that moderate physical activity strengthens the immune system compared to sitting (9). As a direct result, decreased physical activity and increased inactivity have been associated with impaired well-being and mental, physical and metabolic health. During the pandemic, surveys aiming to assess the effects of lockdown on inactivity and to reveal insufficient physical activity were conducted in many countries (10,11).

The higher rates of COVID-19-related hospitalizations in people aged 65 and over are a worrying issue regarding public health services and costs. Since the pandemic causes deaths and serious health problems, World Health Organization and country governments have taken a series of measures including isolation and adopting social distancing to prevent the spread of the virus. Along with these measures, behavioral measures such as personal hygiene, wearing a mask, healthy nutrition and physical activity are potential strategies to prevent or alleviate the disease (12,13).

Some studies in the literature suggest that being physically active can alleviate the effects of COVID-19 in humans and reducing or eliminating inactivity will likely result in significant increases in the life expectancy of the world's population (14-16). Another study reported that physical inactivity increased the relative risk for admission in COVID-19 hospital in a UK cohort by 32% (17), suggesting that adopting an active lifestyle might reduce the risk of serious infections. This finding was supported by another population-based study that showed that consistent adherence to PA guidelines was strongly associated with a reduced risk of serious COVID-19 outcomes among infected adults (18). Recently, a retrospective study reported that sedentary lifestyle was associated with mortality in inpatients with COVID-19 [hazard ratio (HR), 5.91] (19).

Additionally, all these studies offered physiological hypotheses that could explain such correlation. Therefore, physical activity may be an important prevention strategy against COVID-19. It may also play a key role in preventing hospitalizations and promoting faster recovery of infected patients. This study aims to evaluate the correlation between physical activity before pandemic and quarantine measures, hospitalization status and length of stay in patients infected with COVID-19. We think that the present study, which will investigate the hypothesis that physically active patients diagnosed as having COVID-19 have a lower time of discharge compared to patients with insufficient physical activity level, will contribute to the literature in this sense.

Methods

Design

This study was carried out upon the approval (decision dated: 18.05.2021 and numbered: 06) of Social and Human Sciences Research Ethics Committee. The study was a cross-sectional study examining the correlation between time of discharge and pre-COVID-19 physical activity levels in outpatients and inpatients diagnosed as having COVID-19. The data were obtained by sending the electronic link of the online (google form) questionnaire to individuals who were diagnosed as having COVID-19 between June and August 2021 and who wanted to participate in the study voluntarily, through social

media, hospital staff, and medical care providers across the country. Seven hundred thirty nine patients to whom the online questionnaire was delivered voluntarily participated in the study within the specified periods. Six hundred thirty eight patients (female and male) who filled out the questionnaire appropriately and completely were included in the study. All participants gave written informed consent online.

Data Collection Tools

In the study, the questionnaire prepared by the researchers reviewing the studies in the literature included questions about participants' personal information (gender, age, height, weight, smoking status, presence of chronic disease), pre-COVID-19 physical activity level, hospitalization status, and discharge times of inpatients (20,21). Patients who were diagnosed as having COVID-19 through polymerase chain reaction (PCR) viral test (qPCR), blood test and rapid antibody test and discharged from the hospital were included in the study. Exclusion criteria for patients were determined as follows; having difficulty in completing the electronic form, being illiterate, being currently hospitalized and having symptoms of COVID-19.

Statistical Analysis

The computer program SPSS version 22 was used for data analysis. Number (n) and percentage (%) values were used in the analysis of demographic variables of the participants. Chi-square test was used to determine whether or not there was a correlation between hospitalization status and hospitalization duration and other variables. Significance level was accepted as $p<0.05$. GraphPad Software The GraphPad Prism 6 was used for graphical expression (Figure 1).

Results

Descriptive statistics of the participants relating to the anthropometric parameters and percent demographic distribution are shown in Table 1 and Figure 2, respectively. A total of 638 patients participated in the study. Of the participants 47.8% (n=305) were female and 52.2% (n=333) were male. Their mean age was 51.86±21.48.

When the rates of hospitalization due to COVID-19 were compared, it was found that there was no significant correlation between rates of hospitalization and gender (X^2 =0.009, $p>0.05$).

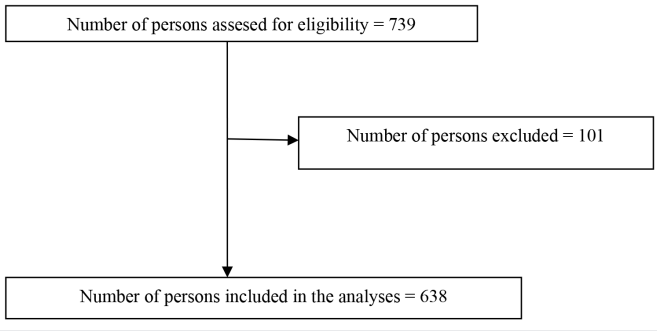

Figure 1. Descriptive statistics of the participants

The rate of hospitalization in patients aged 65 and older was more than twice compared to adults aged 0-45 (X^2 =138.279, $p<0.05$). While 78.7% of the patients who were hospitalized due to COVID-19 were smokers, 62.0% of the outpatients were non-smokers (X^2 =98.988, $p<0.05$). Similarly, it was found that while 81.6% of the inpatients suffered from a chronic disease, 61.8% of the outpatients had no chronic disease (X^2 =107.893, $p<0.05$, Table 2).

It was determined that 71.2% of the inpatients who received treatment due to COVID-19 did not do physical activity and 52.4% did physical activity for 1-3 days. On the other hand, the rate of those who did physical activity for 4-7 days was 12.9%. Of the outpatients 87.1% were physically active for 4-7 days a week. There was a significant correlation between the frequency of doing physical activity before COVID-19 and hospitalization status among patients diagnosed as having COVID-19 (X^2 =81.169, $p<0.05$). Per the results of the current study, the duration of hospitalization is related to the frequency of physical activity levels before COVID-19 to a greater extent (Table 3). In other terms, our results clearly indicated that the individuals who had a decreased physical activity level before COVID-19 had relatively longer stay at the hospital before they were discharged (Figure 4).

When the participants' durations of hospitalization for COVID-19 were compared, it was found that there was no significant correlation between duration of hospitalization and gender (X^2 =0.144, $p>0.05$). In very old patients (85 years and over), the duration of hospitalization was considerably higher (89.4%) compared to the others (X^2 =20.953, $p<0.05$). Among the patients who were hospitalized due to COVID-19, 90.9% of smokers were hospitalized for 8 days or more, and non-smokers were hospitalized less (X^2 =81.971, $p<0.05$). Similarly, 97.2%

Table 1. Descriptive statistics of the participants

	Mean	Standard deviation
Age	51.86	±21.48
Height (cm)	174.15	±7.31
Weight before COVID-19 (kg)	75.35	±10.84
Current weight (kg)	78.06	±10.73

(n=638)
COVID-19: Coronavirus disease-2019

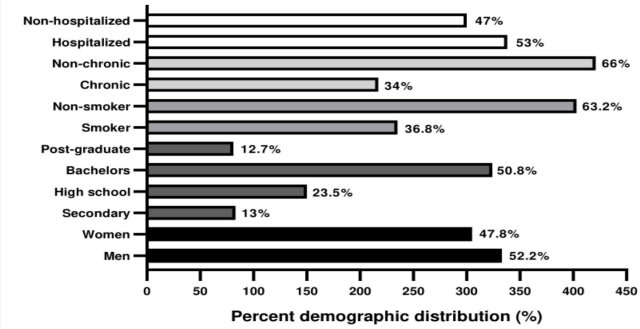

Figure 2. Hospitalization status based on frequency of doing physical activity before COVID-19

of patients with chronic diseases among the inpatients were hospitalized for longer times (X^2 =124.038, p<0.05) (Table 4).

It was determined that among the inpatients who received treatment due to COVID-19, 97.9% of those who did not do physical activity and 52.4% of those who did physical activity for 1-3 days were hospitalized for 8 days and more. On the other hand, 23.5% for those who did physical activity for 4-7 days were hospitalized for 8 days and more. There was a significant correlation between the frequency of doing physical activity before COVID-19 and the duration of hospitalization in patients diagnosed as having COVID-19 (X^2 =93.227, p<0.05). As the

Table 2. Chi-square table of hospitalization based on some variables

		Hospitalization							
		Yes		No		Total		X^2	p
		N	%	N	%	N	%		
Gender	Female	161	52.8	144	47.2	305	100	0.009	0.926
	Male	177	53.2	156	46.8	333	100		
Age	Adolescent (0-17)	11	42.3	15	57.7	26	100	138.279	**0.001***
	Young (18-44)	145	36.3	254	63.7	399	100		
	Young-old (45-74)	61	78.2	17	21.8	78	100		
	Old (75-84)	74	90.2	8	9.8	82	100		
	Very old (85 and over)	47	88.7	6	11.3	53	100		
Smoking	Yes	185	78.7	50	21.3	235	100	98.988	**0.001***
	No	153	38.0	250	62.0	403	100		
Chronic disease	Yes	177	81.6	40	18.4	217	100	107.893	**0.001***
	No	161	38.2	260	61.8	421	100		

*p<0.05; X^2: Pearson chi-square test

Table 3. Chi-square table for hospitalization status based on frequency of physical activity before COVID-19

		Hospitalization status							
		Yes		No		Total		X^2	p
		N	%	N	%	N	%		
FPAB COVID-19	No	141	71.2	57	28.8	198	100	81.169	**0.001***
	1-3 days	186	52.4	169	47.6	355	100		
	4-7 days	11	12.9	74	87.1	85	100		

*p<0.05; FPA: Frequency of physical activity before COVID-19; X^2: Pearson chi-square test

Table 4. Chi-square table for duration of hospitalization based on some variables

		Duration of hospitalization							
		0-7 days		8 days and longer		Total		X^2	p
		N	%	N	%	N	%		
Gender	Female	47	28.8	116	71.2	163	100	0.144	0.705
	Male	58	30.7	131	69.3	189	100		
Age	Adolescent (0-17)	9	75	3	25	12	100	20.953	**0.001***
	Young (18-44)	51	32.3	107	67.7	158	100		
	Young-old (45-74)	20	32.8	41	67.2	61	100		
	Old (75-84)	20	27	54	73	74	100		
	Very old (85 and over)	5	10.6	42	89.4	47	100		
Smoking	Yes	17	9.1	170	90.9	187	100	81.971	**0.001***
	No	88	53.3	77	46.7	165	100		
Chronic disease	Yes	5	2.8	172	97.2	177	100	124.038	**0.001***
	No	100	57.1	75	42.9	175	100		

*p<0.05; X^2: Pearson chi-square test

Table 5. Chi-square table for duration of hospitalization based on frequency of doing physical activity before COVID-19

		Duration of hospitalization							
		0-7 days		8 days and longer		Total		X^2	p
		N	%	N	%	N	%		
FPAB COVID-19	No	3	2.1	138	97.9	141	100	93.227	**0.001***
	1-3 days	89	45.9	105	54.1	194	100		
	4-7 days	13	76.5	4	23.5	141	100		

*p<0.05; X^2: Pearson chi-square test; FPAB: Frequency of physical activity before COVID-19
COVID-19: Coronavirus disease-2019

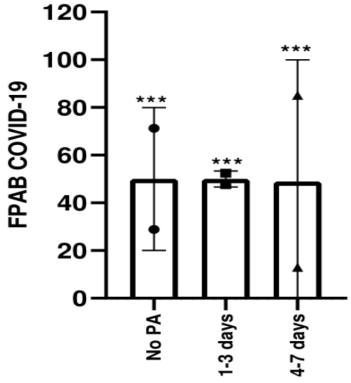

Figure 3. Duration of hospitalization in terms of frequency of doing physical activity before COVID-19
****p<0.05*
COVID-19: Coronavirus disease-2019

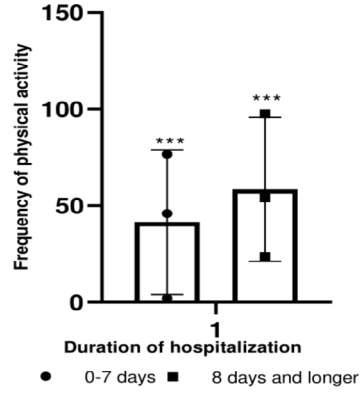

Figure 4. Duration of Hospitalization in Terms of Frequency of Doing Physical Activity Before COVID-19
****p<0.05*
COVID-19: Coronavirus disease-2019

number of days of being physically active increased, the length of hospital stay decreased (Table 5 and Figure 3).

Discussion

The findings of the study revealed no significant correlation between the genders of the participants and their hospitalization status for COVID-19 and duration of hospitalization. It can be asserted that the hospitalization and thus the length of hospital stay are mostly associated with exposure to the virus, immune system, genetic factors, age, chronic disease and similar conditions, regardless of gender. In their study, Turan and Parmaksız (22) included 3506 patients who were hospitalized due to the diagnosis of COVID-19 and stated that hospitalization status and duration of hospitalization did not differ according to the gender of the individuals. The findings obtained from the study are compatible with results of the study. De Souza et al. (23), on the other hand, reported in their study that there was a difference between genders in terms of hospitalization status and the rate of hospitalization was higher in men than women. In the study conducted by Price-Haywood et al. (24) on 3,481 participants, they compared hospitalization and death rates between white and black patients with COVID-19 and found that the hospitalization rates of women were lower than the rates of men. It was thought that the difference between the results of these studies and the result of the present study was associated with the characteristics of the sample group, and the fact that they were conducted in different countries and in different age groups. Furthermore, the fact that men have a higher rate of contracting COVID-19 and being hospitalized than women is associated with the fact that men consume products that adversely affect the immune system, such as alcohol and cigarettes at higher rates (25,26).

While a significant correlation was found between the ages of inpatients diagnosed as having COVID-19, their hospitalization status and hospitalization duration, the rate of inpatient treatment in patients aged 65 and over was more than twice that of adults aged 0-45. Additionally, the duration of hospitalization was higher in very old (85 years and over) patients (89.4%) compared to individuals in the other age groups. As the individuals get older, their number of hospitalizations due to the disease increases and their duration of hospitalization is prolonged. It can be asserted that the elderly have many chronic diseases and their immune systems are weak, which increases the risk of these individuals contracting the disease, and therefore they have the disease more severely. As a matter of fact, in their study, Price-Haywood et al. (24) demonstrated the age variable as a factor affecting the hospitalization status due to COVID-19 and stated that the hospitalized patients had a mean age of 54 years. Likewise, Du et al. (27) stated that individuals aged 65 and over had an alarmingly high rate of COVID-19-related hospitalization and mortality. In another study, it was emphasized that COVID-19 caused less negative effects in individuals under the age of 50, while the effects and mortality rates were higher in older individuals (28,29). The findings of that study and the

results of the present study were similar, which supported the literature regarding the correlation between COVID-19 and age.

The findings of the present study indicated that a great majority of patients who were hospitalized due to COVID-19 smoked and suffered from chronic diseases. Likewise, smokers and those with chronic diseases among inpatients had longer hospital stays. A correlation was found between smoking and having a chronic disease and the hospitalization status for COVID-19 and the length of stay in the hospital. It is known that smoking has negative effects on human health and causes diseases such as chronic obstructive pulmonary disease and asthma. Since COVID-19 is also an upper respiratory tract infection, it is possible to say that individuals who contract the disease and are smokers suffer from the disease more severely when infected. Furthermore, due to the weaker immune systems of individuals with chronic diseases, it is thought that the hospitalization rates and durations of these individuals are higher if they are infected. Numerous studies that are similar to findings of the present study have reported that there is a correlation between smoking and the risk of contracting COVID-19 disease and the severity of the disease (30-33). Sandalcı et al. (34) stated in their review study that individuals with chronic diseases had a higher risk of being infected with COVID-19, the disease progressed more severely in these individuals when infected, and the mortality rate is higher with intensive care. Likewise, there are many studies in the literature reporting that there is a correlation between presence of chronic disease and hospitalization due to COVID-19, and between length of stay and severe course of the illness (29,31,35,36). The results of the other studies and the findings of the present study reveal that both smoking and having a chronic disease are important factors affecting the process of COVID-19.

In the present study, it was determined that there was a significant correlation between the frequency of physical activity before COVID-19 and the hospitalization status and duration of hospitalization among the individuals diagnosed as having the disease. De Souza et al. (23) also reported in their study that physical activity was correlated with hospitalization duration, and doing physical activity at enough level shortened the duration of COVID-19-related hospitalization. The result of that study is compatible with results of the present study. In addition, there are many studies that are consistent with the results of the present study and show that the rates of contracting COVID-19, hospitalization and death rates have reduced in individuals who do physical activity compared to sedentary individuals (19-21,37,38). Although there are many factors associated with COVID-19, it can be said that this situation can be associated with the positive effects of physical activity on the immune system and the fact that physically active individuals have a stronger immune system compared to sedentary ones. These studies suggest that physical activity can prevent poor outcomes in infected patients in terms of COVID-19-related hospital admissions, hospitalization status, and duration of hospitalization. However, in a study, it was stated that there was no significant correlation between the length of stay and physical activity levels of patients hospitalized due to COVID-19 (39). This study differs from the results of the present study and many other studies. It can be said that the difference was caused by the characteristics of the sample group included in the study and the level of the physical activity of the individuals included in the study. Although low and moderate physical activity is beneficial for the immune system, high-intensity activities can suppress the immune system.

Study Limitations

The limited number of studies evaluating the correlation between the hospitalization status and duration of individuals with COVID-19 and the frequency of doing physical activity before COVID-19 constitutes the strength of the present study. While this makes the present study important, it also has limitations. The main limitations of the study are that data were collected by questionnaire instead of a direct measurement method (pedometer, etc.) in determining the frequency and level of physical activity, of the sample was inadequate to represent the population, individuals from different populations were not reached, and the data collection process covered only a few months. In addition, the results of the study should be interpreted due to the existing limitations and the fact that this study is an observational study, the results should be interpreted cautiously.

Conclusion

Consequently, being physically active before the COVID-19 pandemic contributes to the prevention of hospitalization due to illness, shortening of hospitalization duration and a milder course of the disease. Physical activity can be regarded as a tool to protect from negative effects in COVID-19, as in all other diseases. Considering many different factors, PA in inpatients with COVID-19 can be associated with hospital admission, hospitalization and length of stay. Particularly being physically active in preventing COVID-19 may prevent the comorbidity associated with a poor prognosis for this disease. In addition, it can be asserted that physical inactivity is a predictor of longer hospital stays among patients with COVID-19 living in the community. Adequate physical activity is associated with a lower prevalence of COVID-19-related hospitalizations. Therefore, the current data of the present study suggest that being physically active among inpatients with COVID-19 may change the patients' hospital admission, hospitalization status and length of stay.

Ethics

Ethics Committee Approval: This study was carried out upon the approval (decision dated: 18.05.2021 and numbered: 06) of Social and Human Sciences Research Ethics Committee.

Peer-review: Externally peer reviewed.

Authorship Contributions

Concept: E.G., N.D., P.T.D., Design: E.G., N.D., P.T.D., Data Collection or Processing: E.G., N.D., P.T.D., Analysis or Interpretation: E.G., N.D., P.T.D., G.U., Literature Search: E.G., N.D., P.T.D., Writing: E.G., N.D., P.T.D.

Conflict of Interest: No conflict of interest was declared by the authors.

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