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THE RELATIONSHIP BETWEEN PHYSICAL ACTIVITY AND COVID-19 SEVERITY IN TEACHERS AND UNIVERSITY STUDENTS DURING THE PANDEMIC PERIOD

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ABSTRACT

In this study, it is aimed to investigate the relationship between the physical activity (PA) status of teachers at the basic education level and university students and COVID-19 severity in a period when public health restrictions continue due to the global pandemic and the COVID-19 vaccine program has not started yet. The data of 1414 participants (848 females and 556 males) between the ages of 18 and 64 who were basic education teachers and Uşak University students in the province of Uşak were collected in May 2021, prior to the National Vaccination Program in the 15th month of the pandemic, using the Online Questionnaire Form method. To test hypotheses on the distributions of categorical data, a Pearson Chi-Square analysis was performed. To determine the association between continuous variables, Spearman's correlation coefficient was utilised. The obesity incidence among the participants was low at 7.8%, while the rate of those whose body weight increased relative to the pre-pandemic era was exceptional at 45.9%. In comparison to the pre-pandemic period, 44.3% of individuals indicated that their usual weekly physical activity reduced. Consistent with the literature, the rate of smokers with severe COVID-19 disease was found to be greater than that of nonsmokers. Importantly, as the weekly regular PA duration increased, COVID-19 severity decreased. The fact that all teachers and university students have sufficient PA duration is dramatically less (10.6%), which brings with it a higher risk of severe COVID-19 severity. Considering both acute and chronic benefits, following the recommendations for duration of PA, regardless of its kind, can make a significant contribution to the prevention and treatment of symptoms of COVID-19. However, it is feasible to obtain additional benefits by avoiding smoking and obesity.

Keywords: COVID-19 severity, physical activity, obesity, teacher, university student.

INTRODUCTION

On January 7, 2020, 2019-nCoV was identified as a novel coronavirus not before found in humans. Later, the 2019-nCoV disease was given the designation COVID-19, and on March 9, 2020, the World Health Organization (WHO) proclaimed it an epidemic (Bayraktaroğlu et al., 2020). On March 9, 2020, the first COVID-19 case in Turkey was found. In Turkey, like in the rest of the world, there have been fluctuating rises in the number of pandemic cases and deaths over the course of more than a year (SB, 2022). Due to the pandemic that has lasted for more than two years, the global population's way of life has changed, prompting the World Health Organization (WHO) and state leaders to take extremely stringent measures to avoid the epidemic and safeguard human health. As of April 29, 2020, according to UNESCO data, approximately 1,725,082,528 students were affected by the closure of schools due to the epidemic, and physical education was interrupted in 186 countries on a national level and in many countries on a local level, affecting more than 90% of the world's student population (UNESCO, 2020).

As of March 16, 2020, face-to-face education in primary, secondary, high school, and colleges has been suspended in Turkey. Due to the increase in instances around the country and the choices to keep schools closed, it has been agreed to implement distant education beginning on March 23 at all levels of education and universities. As the rate of the epidemic's spread slowed as a result of the precautions taken against it, schools gradually reopened across the nation on August 31, 2020, and diluted classroom practise commenced (Başegmez & Aydın, 2022). The Council of Higher Education (YÖK) announced on September 3, 2021 that a blended (hybrid) education model could also be used in formal programmes in higher education institutions, based on the progression of the COVID-19 epidemic, but that face-to-face education would be given priority, and that implementation had begun (YÖK, 2021). Frequent national curfews have been imposed, and a "gradual normalisation" approach has been implemented since May 17, 2021 (İB, 2021).

One of the main consequences of the pandemic is a strong change in people's habits and behaviour. COVID-19 adversely affected the motor behavior, regular exercise level, eating and nutrition patterns of students in all age groups worldwide (Clemente-Suárez et.al., 2022). Numerous studies indicate that individuals' levels of physical activity (PA) significantly decrease during quarantine. As part of the COVID-19 measures, those who are inactive at home may develop physical issues. It was discovered that the physical activity levels of patients reduced dramatically throughout the quarantine period, resulting in numerous health concerns, particularly cardiovascular, respiratory neuromuscular function, and melancholy (Çapan Özeren et al., 2022). Therefore, frequent exercise is essential, particularly before to contracting the condition, as it strengthens the immune system (Fisher and Heymann, 2020).

Determining the physical activity status of individuals during the social distancing and quarantine process is important for governments and health care providers to make recommendations for individuals to stay physically active, start and maintain exercise during the stay at home (Nyenhuis, 2020). When the physical activity data of 30 million users, shared by Fitbit Inc., which is a wearable device company that monitors the

physical activity level of individuals, are evaluated, it has been revealed that there is a decrease between 7% and 38% in the average step counts in almost all countries compared to the same period of the previous year (Kaya Ciddi and Yazgan, 2020). As regular PA improves immunity, a growing number of studies have investigated whether PA can alter the negative course of COVID-19 (Damiot et al., 2020; Gualano, 2022). One study reported that physical inactivity is one of the risk issues for severe COVID-19 requiring hospitalization (Hamer et al., 2020). Another population-based study of 48,440 people in the United States of America showed that participants who were consistently sedentary had a higher risk of further hospitalizations and intensive care unit admissions. A nationwide cohort study in South Korea reported that participants who adhered to recommendations for both aerobic and strengthening activities had a lower risk of SARS-CoV-2 infection (Hamer et al., 2020). However, in another study, PA was not associated with the length of hospital stay or any other clinical outcomes of COVID-19 patients (Pinto et al., 2021).

Therefore, it is a matter of curiosity whether physical activity decreases in both university students and teachers due to the suggestions of health authorities to stay home as much as possible during the pandemic, curfews and the transition to online education, and the relationship between physical activity level and severity of COVID-19 symptoms. In this study, it is aimed to investigate the relationship between the PA status of teachers at the basic education level and university students and COVID-19 severity in a period when public health restrictions continue due to the global pandemic and the COVID-19 vaccine program has not started yet.

By determining the relationship between the COVID-19 severity and physical activity level of teachers and university students before vaccination programs; it is evaluated that it will contribute to the development of solution proposals in possible pandemic situations in the future and to similar studies to be carried out in different groups in the society, and to contribute to physical activity/sports research and physical mobility/sports awareness.

METHOD

The study is a descriptive research designed according to the cross-sectional survey model. For the application of the online questionnaire forms, official permission was obtained from the Uşak University Rectorate and Uşak Provincial Directorate of National Education.

Participants

The sample selection of the research has been made by the convenience sampling method with the teachers of the basic education level and the students of Uşak University residing in the province of Uşak, between the ages of 18-64. In order to increase the study sample, data of two community groups were targeted, as they were subject to similar working environments, holidays and rules during the pandemic period. Descriptive information about the participants is presented in Table 1.

Teachers: The total number of teachers employed in kindergartens, primary schools, secondary schools, and high schools connected with the Uşak Provincial Directorate of National Education is 4,316, and the data of 368 individuals decided by a simple sampling approach were used for this study (MEM, 2021). It is assumed that teachers have not started the COVID-19 vaccination program or have not yet been vaccinated. As of May 31, 2021 in Turkey, the COVID-19 vaccination program has started for teachers aged 65 and over and with chronic diseases, and the vaccination program has been started for all teachers as of June 7, 2021 (SB, 2021a; SB, 2021b).

University Students: The total number of associate and undergraduate students registered at Uşak University is 28,539, and the data of 1046 students determined by simple convenience sampling method were used as the study sample (Uşak University, 2021). In this study, it is assumed that teachers and university students are not involved in COVID-19 vaccination programs. The vaccination program for adults under the age of 65 has not started in Turkey until May 31, 2021 (TRT, 2021).

Data Collection Tools

Since the data to be obtained regarding the COVID-19 severity in teachers and university students, who are among the community groups, and the duration of at least moderate weekly regular physical activity are aimed to reflect the study population, it is aimed to reach the maximum number of people by minimizing the number of questions. For this reason, only the Descriptive Information Form was used as a data collection tool. Data were collected with the Descriptive Information Form prepared by the researcher, the Online Questionnaire Form (Google Form) containing 16 questions to determine the severity of COVID-19 (symptom), the weekly regular PA duration, Body Mass Index (BMI) and mobile phone-based steps. COVID-19 cases are limited to the period from March 7, 2020 to May 31, 2021. With the statement of the participants, those with positive PCR test results were considered to have had COVID-19, and the status of the remaining participants was assumed to be uncertain. Therefore, based on the available data, it is not possible to compare those who have had COVID-19 with those who have not. It is assumed that participants are not involved in COVID-19 vaccination programs. For the severity of COVID-19, the rating used by the WHO and the Ministry of Health was used: 1=No symptoms or Mild 2=Moderate 3=Severe (WHO, 2022; SB, 2022). Due to insufficient data and the identification of numerous false responses, step count data were omitted from the study. BMI was calculated by the researchers according to the self-reported heights and body weights of all participants, by dividing the body weight by the square of the height and evaluated according to the WHO classification. Those with a body mass index below 18.50 kg/m² are classified as underweight, those between 18.50–24.99 kg/m² as normal, those between 25.0-29.99 kg/m² as overweight, and those above 30.0 kg/m² as obese (WHO, 2004).

Teachers and university students received the link to the Online Questionnaire Form via email and Whatsapp groups. In the 15th month of the pandemic, the data of teachers (368 individuals) and university students (1046 people) who willingly participated in the study in May 2021 and whose data were complete were

combined, and a total of 1414 people's data were analysed. Excluded from the study were the data of 23 individuals whose information was erroneous, partial, or repetitious.

Data Analysis

For statistical analysis, the IBM SPSS Statistics 24 package was employed. Frequency distributions of teachers and students, as well as COVID-19 severity, were reviewed and statistically analysed concurrently during the data analysis. The Shapiro-Wilk test was used to determine whether the study's data were normally distributed, and the data were not normally distributed ($p > .05$). To test hypotheses on the distributions of categorical data, a Pearson Chi-Square analysis was performed. To determine the association between continuous variables, Spearman's correlation coefficient was utilised. In the statistical analyses conducted in the study, $p < .05$ was deemed significant.

FINDINGS

Table 1. Frequency Distributions of the Participants.

Group	Gender	N	%
University Student + Teacher	Female	848	60.0
	Male	566	40.0
	Total	1414	100.0
Smoker	Female	154	18.2
	Male	239	42.2
	Total	393	27.8
With chronic disease	Female	86	10.1
	Male	55	9.7
	Total	141	10.0
Diagnosed with COVID-19	Female	134	15.8
	Male	114	20.1
	Total	248	17.5

When Table 1 is examined; 60% (n: 848) of 1414 participants were female and 40% (n: 566) were male. The rate of participants who had COVID-19 as a result of PCR test with the statement of the participants was 17.5% (n: 248). While the rate of smoking in women was 18.2%, this rate rose to 42.2% in men. The rate of chronic disease in the participants was recorded as 10%.

Table 2. Distribution of Weekly Physical Activity Duration in All Participants.

Weekly Physical Activity Duration	N	%
No or less than 60 minutes	902	63.8
60 – 89 min	227	16.1
90 – 119 min	73	5.2
120 – 149 min	62	4.4
150 min or more	150	10.6
Total	1414	100.0

Looking at the distribution of weekly physical activity duration among the participants in Table 2, 63.8% of the participants do less than 60 minutes or no physical activity. It was noted that only 10.6% of the participants did at least 150 minutes and more of physical activity recommended by the WHO (WHO, 2010).

Table 3. Distribution of Change in Weekly Physical Activity Duration in Participants

Change in Weekly Physical Activity Duration	N	%
Decreased	625	44.2
Unchanged	555	39.3
Increased	234	16.5
Total	1414	100.0

Looking at Table 3, the rate of those who reported that their weekly physical activity duration decreased during the pandemic period compared to the pre-pandemic period was 44.2%, and the rate of those who reported that it increased was only 16.5%.

Table 4. Body Mass Index (BMI) Distribution in All Participants.

BMI Group	N	%
Underweight	133	9.4
Normal Weight	813	57.5
Overweight	358	25.3
Obese	110	7.8
Total	1414	100.0

When Table 4 is examined, the rate of obese participants (during the pandemic period) was 7.8% and overweight was 25.3% (33.1% in total).

Table 5. Distribution of Change in Body Weight in All Participant.

Change in Body Weight	N	%
Decreased	349	24.7
Unchanged	416	29.4
Increased	649	45.9
Total	1414	100.0

When the change in body weight of the participants during the pandemic period compared to the pre-pandemic period is examined in Table 5, the rate of those whose body weight increased compared to the pre-pandemic period was determined as 45.9%.

Table 6. Comparison of COVID-19 Severity by Gender in Participants with COVID-19.

Gender	No Symptoms or Mild		Moderate or Severe	Total
	N	%		
Female	N	57	77	134
	%	42.5%	57.5%	100.0%
Male	N	49	65	114
	%	43.0%	57.0%	100.0%
Total	N	106	142	248
	%	42.7%	57.3%	100.0%

Pearson Chi-Square Value: ,005 df: 1 Asymptotic Significance (2-sided): ,944 p>.05

Since there are only 3 people in the Severe group with COVID-19 in Table 6, it was found that COVID-19 severity did not differ according to gender in the analysis performed by combining it with the Moderate group ($p>.05$).

Table 7. Comparison of COVID-19 Severity by BMI in Participants with COVID-19.

BMI Group		No Symptoms or Mild	Moderate or Severe	Total
Underweight	N	16	15	31
	%	51.6%	48.4%	100.0%
Normal Weight	N	55	75	130
	%	42.3%	57.7%	100.0%
Overweight	N	30	38	68
	%	44.1%	55.9%	100.0%
Obese	N	5	14	19
	%	26.3%	73.7%	100.0%
Total	N	106	142	248
	%	42.7%	57.3%	100.0%

Pearson Chi-Square Value: 3.154 df: 3 Asymptotic Significance (2-sided): .368 $p > .05$

When Table 7 is examined, although the rate of obesity with moderate or severe COVID-19 severity is higher than other BMI groups with a figure of 73.7%, this difference in BMI groups was not statistically significant ($p > .05$).

Table 8. Comparison of COVID-19 Severity by Smoking Status in Participants with COVID-19

Smoking Group		No Symptoms or Mild	Moderate or Severe	Total
Smoker	N	22	49	71
	%	31.0%	69.0%	100.0%
Non-smoker	N	84	93	177
	%	47.5%	52.5%	100.0%
Total	N	106	142	248
	%	42.7%	57.3%	100.0%

Pearson Chi-Square Value: 5.618 df: 1 Asymptotic Significance (2-sided): .018 $p < .05$

When Table 8 is examined, COVID-19 severity was found to be statistically significant ($p < .05$) in the participants who had COVID-19 (n: 248) according to the smokers and non-smoker groups. In other words, it can be said that smokers have more severe COVID-19 than non-smokers.

Table 9. Comparison of of COVID-19 Severity by Weekly Physical Activity Duration During the Pandemic Period in Participants with COVID-19

Weekly Physical Activity Duration Group		No Symptoms or Mild	Moderate or Severe	Total
No or less than 150 minutes	N	84	127	211
	%	39.8%	60.2%	100.0%
150 min or more	N	22	15	37
	%	59.5%	40.5%	100.0%
Total	N	106	142	248
	%	42.7%	57.3%	100.0%

Pearson Chi-Square Value: 4.966 df: 1 Asymptotic Significance (2-sided): .026 $p < .05$

In Table 9, it was found statistically significant ($p > .05$) in the participants with COVID-19 (n: 248) that the severity of COVID-19 differs according to the Weekly Physical Activity Duration of the Pandemic Period (two narrowed groups). While 40.5% of those with 150 minutes or more FA had moderate or severe COVID-19, this rate was higher with 60.2% in those who did not have FA or had FA of less than 150 minutes.

Table 10. Relationship between COVID-19 Severity and Age, BMI, Change in Body Weight, Weekly Physical Activity Duration and Change in Weekly Physical Activity Duration in the Participants with COVID-19

Variables		COVID-19 Severity	BMI	Change in Body Weight	Weekly Physical Activity Duration	Change in Weekly Physical Activity Duration
Age	Rho	-.048	.383**	.150**	-.036	-.153**
	P	.224	.000	.009	.287	.008
	N	248	248	248	248	248
Change in Weekly Physical Activity Duration	Rho	-.118*	-.037	-.259**	.308**	
	P	.032	.282	.000	.000	
	N	248	248	248	248	
Weekly Physical Activity Duration	Rho	-.162**	.035	-.151**		
	P	.005	.292	.009		
	N	248	248	248		
Change in Body Weight	Rho	-.097	.374**			
	P	.063	.000			
	N	248	248			
BMI	Rho	.083				
	P	.097				
	N	248				

*: p<.05 **: p<.001

In Table 10, the relationship between COVID-19 Severity and the variables in the participants who had COVID-19 was analyzed. BMI rises with age (p<.001) during the pandemic, there was a correlation between age and body weight change (p<.001). In other words, when age grows, body mass increases even more throughout the epidemic. During the era of the pandemic, there was no correlation between age and the weekly PA duration (p>.05). During the pandemic phase, the weekly PA duration reduces even further with increasing age. The change in weekly PA duration during the pandemic period compared to the previous period and the change in body weight during the pandemic period compared to the previous period were found to be negatively related (p<.001). A positive correlation was found between the change in weekly PA duration in the pandemic period and weekly PA duration in the pandemic period compared to the previous period (p<.001). In other words, those who had a low PA period before the pandemic decreased their PA even more during the pandemic period. The correlation between COVID-19 severity and the change in weekly physical activity length and weekly physical activity duration in the pandemic period was negative and statistically significant (p.05). However, no association between COVID-19 severity and age, BMI, or body weight change during the pandemic period was detected (p>.05). findings of the research; It should support the purpose and problem of the study. In the Results section, only the findings should be presented and explained. Never comment. The comment should be made in the discussion and conclusion part. In the Findings section, explanations can be made using tables, figures, graphics or pictures when necessary.

CONCLUSION and DISCUSSION

As of May 31, 2021 (pandemic duration is approximately 15 months), the total number of COVID-19 cases in Turkey is 5.249.404 (6.3% to the population), the rate of pneumonia in patients is 2.8%, the total number of deaths is 0.9% , the current rate of severe patients: 2.6%, and the rate of mild or asymptomatic patients: 97.4% (SB, 2022). In our study, as of May 31, 2021, the number of 1414 people who had a positive COVID-19 test was

248 (17.5%) (Table 1). This rate is higher than the ratio of total cases to population (6.3%) in Turkey. This suggests that educational environments increase virus contagion faster.

However, in a study conducted with the online form for university students, lecturers and graduates in Bursa, in which 322 volunteers participated as of January 3, 2021 (pandemic period of about 10 months), the rate of COVID-19 transmission was found to be 10% in participants (Bölükbaş et al, 2022). Considering that these data reflect the approximately 10-month pandemic period, it can be considered to be compatible with the data of our study, which includes the 15-month pandemic period. In a study by Dinçer and Kolcu (2021), in which the effects of the pandemic on body weight change were examined, it was noted that body weight gain occurred in adult individuals in the later stages of the pandemic. During the pandemic, Zachary et al. (2020) evaluated the results of 1200 participants, they reported that 22% of individuals had an increase in body weights in the range of 2.3-4.5 kg. In the current study, the rate of obese participants (during the pandemic period) was 7.8% and overweight was 25.3% (33.1% in total) (Table 4). Compared to the pre-pandemic period, the rate of those whose body weight increased was 45.9% (Table 5). When evaluated together with other studies, body weight gain may continue as the duration of the pandemic is prolonged and unless there is a conscious intervention. There are studies that partially link weight gains to eating disorders, unhealthy food consumption and screen time (Bourdas and Zacharakis, 2020).

Bölükbaş et al. (2022), it was found that 65% of the participants were not physically active, 27% were at an insufficient level of activity, and only 8% were active enough. Consistent with the results of this research, 63.8% of the participants in the current study reported that they did not do less than 60 minutes or no PA. It was noted that only 10.6% of the participants did at least 150 minutes or more of PA recommended by WHO (Table 2) (WHO, 2010).

In a study examining the physical activity levels of Australian individuals, it was found that the physical activity of individuals during the epidemic changed 48% negatively (Stanton et al., 2020). Castañeda-Babarro et al. (2020) reported that over 3,800 healthy Hispanic adults aged 18-64, the reported daily PA dropped during the one-month COVID-19 quarantine period, particularly among young people, students, and very active men. In a systematic review that included 23 research conducted during the quarantine period, Zaccagni et al. (2021) found that the degree of physical activity in persons reduced significantly compared to pre-quarantine. In the current study, 44.2% of participants stated that their weekly physical activity duration reduced relative to the pre-pandemic period, while only 16.5% claimed that it rose (Table 3). The proportional expression of this change is essential for demonstrating the efficacy of potential future improvement measures.

According to the results of the study done to investigate the association between obesity and COVID-19, when the body mass index (BMI) of COVID-19 cases grows, disease rates and disease severity increase, and more intensive care therapy and mechanical ventilation are required (Petrilli et al., 2020; Mahase 2020). It has been reported that the probability of developing severe COVID-19 at the time of admission to the hospital is 1.4 times higher in obese patients than in normal-weight patients (Denova-Gutiérrez et al., 2020). However, in the

current study, unlike the results of the above research, although the rate of obesity with moderate or severe of COVID-19 severity was higher than other BMI groups with a figure of 73.7%, this difference in BMI groups was not statistically significant (Table 7). This may be explained by the low number of obese infected participants or by possible confounding factors (regular physical activity, not smoking, good health, etc.).

A study of 1173 people diagnosed with COVID-19 indicated that the proportion of smokers with severe symptoms was greater than that of nonsmokers (Adrish et al., 2020). According to a meta-analysis, smoking is a risk factor for COVID-19 development reported that smoking raises the likelihood of progression 1.91 times (Patanavanich and Glantz, 2020). In this study, it was discovered that smokers had a higher incidence of severe COVID-19 disease than nonsmokers (Table 8). This can be explained by the deleterious effects of smoking on the defensive mechanisms of the respiratory system, hence producing a significant risk factor for respiratory tract infections (Feldman and Anderson, 2013).

The World Health Organization recommends that all healthy adults aged 18-64 should do 150 minutes of moderate-intensity physical activity per week or 75 minutes of vigorous-intensity physical activity per week (WHO, 2010). In the evaluation made by considering the history of PA for at least 12 months before the pandemic, of 212,768 Korean adults diagnosed with COVID-19 between January 1, 2020 and May 30, 2020 in South Korea, adults who did physical activity at recommended levels were found to have severe COVID-19 disease and COVID-19. was associated with a reduced probability of associated death (Lee et al., 2022). However, some authors have reported that an increase in physical activity from 150 minutes to 200-400 minutes per week is required to compensate for an active lifestyle in cases of movement restriction (Polero et al., 2020).

Consistent with the literature, a noteworthy finding of the current study is that as the duration of weekly physical activity increases during the pandemic period, COVID-19 severity reduces (Table 10). In the study, the fact that the rate of having sufficient PA duration in all teachers and university students is dramatically less (10.6%), brings with it a higher risk of severe COVID-19 severity. Considering both acute and chronic benefits, following the recommendations for duration of PA, regardless of its kind, can make a significant contribution to the prevention and treatment of symptoms of COVID-19. However, additional benefits can be obtained by avoiding smoking and excessive weight gain (Clemente-Suárez et al., 2022).

RECOMMENDATIONS

Regardless of the nature of PA, following the recommendations to keep PA duration 150 minutes or more per week can make a significant contribution to the prevention of COVID-19. With adequate PA, it is possible to obtain more benefits by avoiding smoking and excessive weight gain. Large-scale randomized controlled trials of public health programs should test data from observational studies and gather information on optimal PA recommendation to prevent severe COVID-19.

ETHICAL TEXT

In this article, the journal writing rules, publication principles, research and publication ethics, and journal ethical rules were followed. The responsibility belongs to the author for any violations that may arise regarding the article. This study was approved by the decision of Uşak University Social and Human Sciences Scientific Research and Publication Ethics Committee dated 06.05.2021 and numbered 2021-87. For the application of the online questionnaire forms, official permission was obtained from the Uşak University Rectorate and Uşak Provincial Directorate of National Education.

Author Contribution Rate: The author's contribution rate in this study is 100%.

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