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Evaluation of the Physical Activity Levels of the Students in a Physical Education and Sports Science Department Before and During the Coronavirus Pandemic

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Abstract

The COVID-19 has been declared a pandemic by the World Health Organization (WHO). Since Covid-19 is highly contagious, people were asked to go into quarantine, and the education system was interrupted as a result. In our study, we aimed to evaluate changes in the physical activity levels of the students attending the Department of Physical Education and Sport Science (PESF) Before the Coronavirus Pandemic (BCP) and During Coronavirus Pandemic (DCP). 131 students attending PESF were included in the study. The long form of the International Physical Activity Questionnaire (IPAQ) was used to determine physical activity levels. The IPAQ data was obtained at two separate times–as BCP and DCP. The IBM SPSS software package was used in the statistical analysis of the data obtained, and the Mann-Whitney U and two-way analysis of variance tests were conducted. There was a decrease in the physical activity levels of PESF students related to work, transportation, housework and leisure time at the rates of 35.40%, 21.66%, 7.43%, and 31.66%, respectively, in terms of BCP and DCP. However, it was observed that the highest decline level was 46.69% in intense physical activity. In the evaluation of BCP and DCP, a significant difference was found in transportation (p: 0.001; d: 0.440), leisure time (p: 0.001; d: 447), time spent sitting in a weekday (p: 0.026; d: 0.291), walking (p: 0.006; d: 0.362), and total physical activity levels (p: 0.005; d: 0.368). There a significant difference in the activity level related to time spent sitting in a weekend according to gender differences ($p < 0.005$). According to the IPAQ assessment conducted as BCP and DCP, a significant decrease in the physical activity levels of PESF students was observed during the pandemic caused by the COVID-19 infection. These results should not be ignored because a significant decrease in physical activity may cause negative effects on blood glucose levels and body composition, increase the risk of depression and anxiety disorders, and decrease the quality of life and immune system.

Keywords: physical education, physical education and sports student, Covid-19, pandemic

1. Introduction

The outbreak of the COVID-19 infection was declared a pandemic on March 11, 2020 by the World Health Organization (WHO, 2020). Because of this infection that started in in the city of Wuhan in the Hubei province of China and spread all over the world, there were 5,490,954 confirmed cases and 345,962 deaths worldwide as of May 25 (WHO, 2020), up from 509,164 cases and 23,335 deaths on March 27 (Petersen & Gökengin, 2020). The SARS-CoV infection had a 9.7% mortality rate with 8,098 cases and 774 deaths in 2003 (WHO, 2020). While SARS-CoV symptoms are 6-11 days, the speed of appearance of SARS-CoV-2 symptoms for 5-6 days makes quarantine practices difficult (Wang & Zhang, 2020; Cheng et al., 2004; Petersen & Gökengin, 2020). SARS-CoV-2 has been determined by the World Health Organization as being highly contagious with close contact (WHO, 2020) and with an average incubation time of 5.8 days (Backer et al., 2020).

Although the SARS-CoV-2 contagion rate seems the same in adults and children, clinical cases rarely appear in children. At the same time, the pre-symptomatic carrier rate is high in children and adolescents (Wei et al., 2020; Cheng et al., 2020). This makes it difficult to take measures to prevent contagion, and national governments have decided to close schools. To control the pre-symptomatic spread of SARS-CoV-2, COVID-19 pandemic, social distancing and avoiding crowded areas have played an important role (Wei et al., 2020). Thus, voluntary

quarantine was implemented in many countries of the world in order to separate individuals who have been exposed to COVID-19 infection but who are pre-symptomatic from others. The possibility of pre-symptomatic contagion of SARS-CoV-2 makes it difficult to perform prevention measures that mainly involve early detection and isolation of symptomatic individuals (Wei et al., 2020).

The effect of physical activity on the immune system varies depending on the intensity and duration of the activity and the level of physical fitness of the individual. The natural killer (NK) cell is a white blood cell produced by the immune system that helps the body's defenses by recognizing and destroying foreign and harmful substances (viruses, germs, etc.). NK cells, as the first defense mechanism protecting against diseases, can provide important data in measuring the activity of these cells and evaluating our immune system (Mackinnon, 1989; Shephard et al., 1994; Nieman et al., 1990).

The response of the immune system to chronic and acute exercise stress varies (Mackinnon, 1989; Nieman et al., 1990) depending on the duration and intensity of the activity. According to individual differences and type of activity, duration, and intensity, the period during which the concentration of the lymphocyte decreases between three and 72 hours, and cell proliferation and immunoglobulin production with cytotoxic activity decrease allowing microorganisms to enter the body and cause infections; thus, and the immunity is weakened, referred to as an "open window" (Nieman & Pedersen, 1999).

Physical activity (PA) refers to the whole of an individual's physical movements depending on their life style. Studies show that regular exercise and PA have positive effects on life span (Paffenbarger et al., 1994; Powell et al., 2011). According to the report published by the World Health Organization in 2002, a sedentary lifestyle causes the death of 1.9 million people worldwide annually. Low PA is an important public health problem. An unhealthy community reduces production and increases government health expenditures, resulting in resource consumption. For this reason, the American Association of Sports Physicians (ACSM) recommends that sedentary individuals perform a moderate intensity exercise program for at least three days a week for 30 minutes. Exercise at 55-65% of the maximum heart rate (HRmax) or 40-50% of the heart rate reserve for moderate PA is defined as a minimum threshold for the development of aerobic capacity in sedentary individuals (Franklin, 2000).

As the number of healthy living areas increases, the risks from diseases such as cardiovascular disease, diabetes, and the possibility of developing cancer decrease. Individuals who do regular exercise and PA experience a 60% lower rate of damage to the heart during a myocardial infarction (heart attack) than those who do not (Borges et al., 2014; Powers et al., 2014). At the same time, thanks to the positive effects of regular exercise on body composition and PA, the blood glucose level is improved, the risks of type II diabetes is reduced (Helmrich et al., 1994), the risk of breast and uterine cancer in women is decreased (Kruk & Czemiak, 2013), the risk depression and anxiety disorders is decreased, all resulting in an increased life span, psychological well-being, and a positive quality of life.

Determining the level of PA is possible with the metabolic equivalent (MET) score, obtained by gathering information in terms of the type, duration, frequency, and severity of the activity. MET is defined as the energy consumed over one hour, one minute, or 24 hours per kilogram of body weight. This definition is equal to the metabolic rate of a specific activity divided by the resting metabolic rate, in other words, one MET resting oxygen consumption for the average individual. Because 200-250 mL O_2 is consumed per minute on average, twice the resting oxygen consumption or 500 ml oxygen consumption is required for the work of two MET. The PA and MET value may vary in approximate energy expenditures (kj/min) or oxygen consumption in situations where the type and intensity of activities differ, such as walking, cycling, doing housework, and gardening. In the study by Ainsworth et al. published in 1987 and revised in 2000, the equivalence of MET values for different physical activities was calculated (Ainsworth et al., 2000).

In our study, we aimed to investigate the changes in the physical activity levels of students studying at the Department of Physical Education and Sports Sciences during the COVID-19 infection caused by the SARS-CoV-2 virus which was declared a pandemic by the World Health Organization.

2. Method

131 participants who are students at the Department of Physical Education and Sports Sciences were included in the study. The relational screening method was used to determine the sample group. In the study, data indicating the level of physical activity were obtained at two different times, before and during the COVID-19 pandemic. The self-report technique used to determine the level of physical activity is one of the adoptable methods for calculating the amount of energy spent during daily activities in large groups (Ballor et al., 1989; Janz, 1994). The long form of the International Physical Activity Questionnaire (IPAQ) was used to determine the physical activity levels of the individuals (Craig et al., 2003).

In the IPAQ, it is taken as a criterion that "walking, moderate physical activities, and vigorous physical activities" were evaluated based on the time spent and that each activity was performed for at least 10 minutes at a time. In calculating the energy consumption related to physical activities, the weekly duration (minutes) of each activity and the resting oxygen consumption levels (MET) energy values created for the IPAQ were multiplied. Thus, the energy consumption related to the physical activities for each individual was obtained in MET-min/week units.

2.1 Physical Activity Evaluation

A physical activity evaluation was provided to determine the physical activity areas (walking and moderate and vigorous physical activity) and total physical activity levels of the participants with the physical activity assessments below (the data processing and analysis guide of the International Physical Activity Questionnaire). The participants were assessed as standard individuals with 60 kg for the determination of the IPAQ MET-min. scores. The kilogram correction formula [MET-min * (person's body weight (kg)/60 kilograms)] was used to eliminate the calculation errors that might occur from weight differences.

For the analysis of the IPAQ data, the values used were 3.3 MET for walking, 4.0 MET for moderate physical activity, 6.0 MET for bicycle use in transportation, 3.0 MET for moderate physical activity in the house, 5.5 MET for garden work, and 8.0 MET for vigorous physical activity. The question of sedentary time on weekdays and weekends in the IPAQ is an additional informational value that is not included in the calculation at the point of determining the level of physical activity.

The IBM SPSS software package was used in the statistical analysis of the data obtained. The Mann-Whitney U and two-way variance analysis were used after the normality test was conducted. The effect sizes were determined using the Cohen's d formula developed by Fritz et al. (Fritz et al., 2012). The significance level was accepted as $p < 0.05$.

3. Results

Table 1. Physical activity levels of the participants (PA)

Variable			N	Mean	±	Srt. Error of Mean	Variation %
Physical Activity Levels	Job Related PA (met)	BCP	108	1014	±	263	35.40
		DCP	131	655	±	194	
	Transport PA (met)	BCP	108	1999	±	229	21.66
		DCP	131	1566	±	235	
	Housework PA (met)	BCP	108	2097	±	295	7.43
		DCP	131	1941	±	246	
	Leisure Time PA (met)	BCP	108	2779	±	286	31.66
		DCP	131	1899	±	266	
	Time Spent Sitting in a weekday PA (met)	BCP	108	373	±	20	19.03
		DCP	131	444	±	21	
	Time Spent Sitting in a weekend PA (met)	BCP	108	400	±	22	10.75
		DCP	131	443	±	21	
	Total Time Spent Sitting PA (met)	BCP	108	773	±	40	14.87
		DCP	131	888	±	41	
	Walking PA (met)	BCP	108	2977	±	301	13.20
		DCP	131	2584	±	383	
	Moderate Intensity Activity PA (met)	BCP	108	2995	±	388	16.86
		DCP	131	2490	±	296	
	Vigorous PA (met)	BCP	108	1726	±	294	46.69
		DCP	131	920	±	156	
	Total PA (met)	BCP	108	7700	±	707	22.14
		DCP	131	5995	±	641	

The physical activity level of the participants in terms of BCP and DCP may be seen in Table 1. According to the IPAQ evaluations, there was a decrease of 22.14% in total physical activity level. A decrease at the rates of 13.20%, 16.86%, and 46.69% was observed in each of the parameters of walking, moderate PA and vigorous PA, respectively, which constituted the total PA. Along with the decrease in physical activity, there was an increase in

total sedentary time by 14.87%. An increase at the rates of 19.03% and 10.75% was observed in each of the parameters of time spent sitting on weekdays and time spent sitting in a weekend, respectively, which constituted the total sedentary time. While a dramatic decrease was observed in the parameters of work-related PA, 35.40%; transportation-related PA, 21.66%; and leisure-related PA, 31.66%; the PA related to housework decreased by 7.43%.

Table 2. Assessment of participants' MCP and DCP physical activity levels

Variable			N	Rank	U	Z	p	Cohen's d
Physical Activity Levels	Job Related PA (met)	BCP	108	126.01	6425.000	-1.666	0.096	0,158
		DCP	131	115.05				
	Transport PA (met)	BCP	108	136.38	5305.500	-3.329	0.001	0,440
		DCP	131	106.50				
	Housework PA (met)	BCP	108	123.09	6740.500	-0.629	0.529	0,081
		DCP	131	117.45				
	Leisure Time PA (met)	BCP	108	136.63	5278.500	-3.389	0.001	0,447
		DCP	131	106.29				
	Time Spent Sitting in a weekday PA (met)	BCP	108	109.03	5889.500	-2.227	0.026	0,291
		DCP	131	129.04				
	Time Spent Sitting in a weekend PA (met)	BCP	108	114.08	6435.000	-1.201	0.230	0,156
		DCP	131	124.88				
	Total Time Spent Sitting PA (met)	BCP	108	110.98	6100.000	-1.831	0.067	0,239
		DCP	131	127.44				
	Walking PA (met)	BCP	108	133.56	5609.500	-2.756	0.006	0,362
		DCP	131	108.82				
	Moderate Intensity Activity PA (met)	BCP	108	126.13	6412.500	-1.245	0.213	0,161
		DCP	131	114.95				
	Vigorous PA (met)	BCP	108	135.64	5384.500	-3.242	0.001	0,420
		DCP	131	107.10				
	Total PA (met)	BCP	108	133.78	5585.500	-2.799	0.005	0,368
		DCP	131	108.64				

The BCP and DCP physical activity assessments of the participants may be seen in Table 2. According to the IPAQ evaluations, there was a significant difference in transportation PA and leisure time PA levels, $p = 0.001$ ($d = 440$) and $p = 0.001$ ($d = 447$), respectively. There was no significant difference in the levels of work-related PA and the PA related to housework ($p < 0.005$). There was a significant difference between the participants' BCP and DCP total PA ($p = 0.005$, $d = 0.368$) levels. There was a significant difference in the walking PA, $p = 0.006$ ($d = 0.362$), and the vigorous PA levels, p: 0.001 (d: 0.420), which constituted the total PA level.

Table 3. MCP and DCP physical activity assessment according to the gender differences of the participants

Variable			N	BCP (met)	DCP (met)	df	Total of Squares	F	p
Gender+Corona Pandemic PA	Job Related PA (met)	Man	122	1711	935	1	14598647.2	2.504	0.115
		Women	117	175	395				
	Transport PA (met)	Man	117	2143	2412	1	25329879.5	4.067	0.045
		Women	122	1825	782				
	Housework PA (met)	Man	117	2591	2199	1	5157840.54	0.606	0.437
		Women	117	1502	1702				
	Leisure Time PA (met)	Man	117	2942	2686	1	19683080.5	2.224	0.137
		Women	122	2582	1170				
	Time Spent Sitting in a weekday PA (met)	Man	117	399	538	1	222776.90	4.490	0.035
		Women	117	341	358				
	Time Spent Sitting in a weekend PA (met)	Man	122	433	552	1	282248.91	5.558	0.019
		Women	117	361	342				
	Total Time Spent Sitting PA (met)	Man	122	832	1090	1	1006537.70	5.611	0.019
		Women	117	703	700				
	Walking PA (met)	Man	122	2938	3998	1	116303485	8.244	0.004
		Women	117	3024	1273				
	Moderate Intensity Activity PA (met)	Man	122	3812	2875	1	16512411.3	1.237	0.267
		Women	117	2012	2134				
	Vigorous PA (met)	Man	122	2394	1266	1	9553852.34	1.664	0.198
		Women	117	922	600				
	Total PA (met)	Man	122	9145	8140	1	13176406.8	0.259	0.611
		Women	117	5959	4008				

There was a significant difference in the transportation PA level ($p = 0.045$) in the IPAQ evaluations. There was no significant difference in the levels of work related PA, $p = 0.115$; housework PA, 0.437; and leisure time PA 0.137 ($p < 0.005$). There was a significant difference in the evaluation of the time spent sitting in a weekday, $p = 0.035$; at the weekend, 0.019; and the total time spent sitting, 0.019. According to the gender differences of the participants, there was no significant difference between the levels of moderate intensity PA, $p = 0.267$; vigorous PA, 0.198; and total PA, 0.611; in the assessment of the physical activity levels of BCP and DCP. According to the BCP and DCP gender differences, there was a significant difference between genders in the evaluation of the walking PA level ($p = 0.004$, $p < 0.005$).

Table 4. BCP and DCP evaluation between participants who had a hobby

Variable			N	BCP (met)	DCP (met)	df	Total of Squares	F	p
Hobby+Corona Pandemic PA	Job Related PA (met)	Yes	176	1265	712	1	2238493,08	0,368	0,574
		No	63	532	425				
	Transport PA (met)	Yes	176	2174	1575	1	2424941,74	0,368	0,544
		No	63	1664	1529				
	Housework PA (met)	Yes	176	2111	1969	1	106977,18	0,012	0,912
		No	63	2069	1828				
	Leisure Time PA (met)	Yes	176	3158	1763	1	36207229,9	4,017	0,046
		No	63	2050	2451				
	Time Spent Sitting in a weekday PA (met)	Yes	176	361	441	1	2787,23	0,051	0,821
		No	63	394	458				
	Time Spent Sitting in a weekend PA (met)	Yes	176	391	444	1	11662,07	0,203	0,653
		No	63	418	438				
	Total Time Spent Sitting PA (met)	Yes	176	753	885	1	25851,92	0,128	0,721
		No	63	813	897				
	Walking PA (met)	Yes	176	3354	2466	1	32251434,4	2,152	0,144
		No	63	2253	3060				
	Moderate Intensity Activity PA (met)	Yes	176	3068	2856	1	1090,81	0,000	0,993
		No	63	2530	2328				
	Vigorous PA (met)	Yes	176	2009	952	1	10304826,1	1,741	0,188
		No	63	991	791				
	Total PA (met)	Yes	176	8533	5949	1	79605210,5	1,479	0,225
		No	63	6101	6180				

The BCP and DCP evaluation between participants who had a hobby and those who did not may be seen in Table 4. According to the IPAQ assessment carried out, there was a significant difference in the leisure time PA level ($p = 0.046$). There was no significant difference in the levels of the work-related PA, $p = 0.574$; transportation PA, 0.544; and housework PA, 0.912 ($p < 0.005$). In the evaluation of the time spent sitting in a weekday, $p = 0.821$; at the weekend, 0.653; and the total time spent sitting, 0.721, there was no significant difference. In the evaluation of the BCP and DCP physical activity levels between participants who had a hobby and those who did not have a hobby, there was no significant difference in the levels of total PA ($p = 0.225$) and walking PA, $p = 0.144$; moderate intensity PA, 0.993; and vigorous PA, 0.188 which constituted the total PA.

4. Discussion

More than 50% of students studying at university do not take part in regular physical activity (Martin et al., 2000; Eurobarometer, 2002; Pinto et al., 1998). Smoking among university students negatively affects participation in moderate and low intensity physical activity (Burton & Turrell, 2000). The university campus area and the distance between the classroom buildings and social areas can affect the student's mobility on the campus; the physical activity levels of the students living on campus were found to be higher (Cengiz, 2007). At the same time, it was observed that participation in physical activity decreases as individuals get older and pass from high school to university (Gyurcsik et al., 2004). The World Health Organization warns that crowded places threaten human health in the pandemic period caused by COVID-19, and these environments should be avoided as much as possible. At the same time, an increase has been observed in the time spent at home due to the voluntary quarantine practices demanded of the PESF students by the central and national government. It can be said that all of these caused a decrease in the PESF students' levels of physical activity regarding work-related, transportation, housework, and leisure time PA, by 35.40%, 21.66%, 7.43%, and 31.66%, respectively. Along with the decrease in all PA levels, there was a statistically significant difference in the levels of transportation and physical activity in leisure time. On the other hand, despite the fact that the time spent at home was longer, no increase was observed in the level of physical activity related to housework.

The length of the PESF students' home stay period due to the voluntary quarantine brought about an increase, in particular, in the time spent sitting in a weekday (19.03%) (p: 0.026, d: 0.229). This decrease in the time spent sitting in a weekend (10.75%) may be due to a decrease in the time spent at home, and this can be considered as less of an adaptation of PESF students to the voluntary quarantine practices on the weekends. When the university

students were requested to perform voluntary quarantine practices by the national administrations in communal assessments, it was recommended that they evaluate and take preventive measures by taking into account the problems that might occur in the quarantine practices on the weekends.

There are differences in the level of physical activity according to the departments within the university (Dowda et al., 2003; Savcı et al., 2006; Von Bothmer et al., 2005; Tekkanat, 2008). One fifth of those studying in the field of health have a high physical activity capacity (Kadıoğlu et al., 2015), and it has been determined that university students studying in this field have an average physical activity capacity of 1958 ± 1588 MET min/week (Savcı et al., 2006). PESF students have higher physical activity levels than students studying in other departments (Şahin et al., 2017; Tekkanat, 2008). It was observed that PESF students avoided doing vigorous physical activity in the pandemic period caused by COVID-19 infection (46.69%, d: 0.420). More time spent at home and the lack of sufficient physical space and an appropriate environment for vigorous physical activity at home due to voluntary quarantine practices could be an explanatory factor of the decrease in vigorous PA level. On the other hand, another implication that should be taken into consideration is that PESF students avoid vigorous physical activities due to the fact that such activities might have negative effects on the immune system during the infection process (Nieman & Pedersen, 1999) as they take general health information and exercise physiology courses.

While there is no gender difference in PA levels in some departments of universities (Şahin et al., 2017; Von Bothmer et al., 2005; Tekkanat, 2008), it may differ in some departments (Kadıoğlu et al., 2015; Dowda et al., 2003). Among university students, 61% of women and 57% of men avoid moderate or vigorous physical activity (Buckworth et al., 2004). During the pandemic period caused by COVID-19 infection, there were significant differences in PESF students' levels of transportation and walking physical activity in terms of gender. In the pandemic period, it was observed that the energy consumed, especially by male participants, in walking increased while the energy consumed by female participants decreased. It can be concluded that female PESF students had a higher level of compliance with voluntary quarantine practices which resulted in a decrease in their weekly walks. On the other hand, there was a significant increase in the sedentary time spent by male participants in the assessment of all sedentary time by gender.

For PESF students, we can consider a hobby as a relaxing way of expressing curiosity and enjoying recreation which they enjoy by developing their skills and habits in the period that they describe as leisure time. During the pandemic period caused by COVID-19, physical activity levels were evaluated among the participants with and without any hobbies during the voluntary quarantine days. During the pandemic, a significant decrease was observed in the level of physical activity of the participants having a hobby compared to the participants who do not have. PESF students seemed to prefer doing hobbies that require physical activity at lower rates due, to a large extent, to voluntary quarantine practices at this level, which is expected to vary depending on whether their preferred hobbies require physical activity or not.

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