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Impact of Covid-19 pandemic on physical activity and energy expenditure

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Abstract

Objective: The study was primarily conducted to find out the impact of COVID-19 pandemic on physical activity and energy expenditure among physiotherapy professionals and students.
Design and setting: A cross sectional study was conducted across various institutes of Karachi, Pakistan.
Subjects: Physical therapy students (n=264), and Physiotherapy Professionals (n=40).
Tool: The International Physical Activity Questionnaire- Short Form (IPAQ-SF) was used to evaluate levels of physical activity and energy expenditure before and during COVID-19 pandemic.
Results: Out of 420 surveys sent out, 308 surveys were returned showing response rate of 73%. The total physical activity was decreased (-28%) during pandemic (2136.8 MET-min/wk) as compared to physical activity before COVID-19 pandemic (3005 MET-min/wk). Also, the energy expenditure was decreased (-28.9%) during the pandemic (4151.6 MET-min/wk) as compared to before COVID-19 Pandemic (5831.4 MET-min/wk).
Conclusion: A significant reduction in physical activity and energy expenditure was reported from physiotherapy professionals and students during COVID-19 pandemic.

Keywords: Physical activity, Energy Expenditure, Physiotherapy professionals, Physiotherapy students, COVID-19 Pandemic

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1. Introduction

The novel COVID-19 part of (SARC-CoV-2) family was identified as pneumonia of unknown cause in Wuhan, China in December 2019 and then it has been spread to every country and different territories. The first clinical indication that led to discovery of SARS-COV-2 related disease COVID-19 was pneumonia. Later, the reports additionally depicted gastrointestinal symptoms and asymptomatic infections, particularly among young children. The virus was transmitted through close contact with the affected person or by touching the surface or object exposed to the virus. The most common symptoms of this virus are high fever, cold, dry cough, nasal congestion, bone pain and breathing problems. The infection advanced to serious illnesses including dyspnea and extreme chest symptoms related to pneumonia in around 75% of patients as figured by computed tomography (CT) while administered. Even the patients who were asymptomatic had become valid sources for transmitting the virus. It is known that a fragile population for example, the old or patients who are immune-suppressed or present with different comorbidities, are more prone to get exposed to severe coronavirus. The fatality rate of 4.47 times higher was reported in the population between 80 to 89 years as compared to those between 60 to 69 years in Italy. Hypertension, diabetes, and cardiovascular diseases were accounted for as the most frequent co-morbidities among patients with Corona virus requiring hospitalization.

Due to its rapid spread, the World Health Organization (WHO) declared the outbreak of COVID-19 as the sixth public health emergency of international concern (PHEIC) on 30th January 2020 and announced COVID-19 as pandemic on 11th march 2020. Globally 1,995,982 cases and 131,037 deaths were reported on 17th April 2020. A pandemic of this scale has never been seen since the Spanish Influenza during WWI, and has already created dramatic challenges all over the world in terms of economy, social interactions, and individual lifestyles. WHO warned nations to be prepared to face real challenges of COVID-19 due to the acceleration of pandemic. To protect the nation from drastic effects, the Government decided to seal the borders, shut down markets, institutions, schools, playgrounds and public places that still led to different side effects for the population.

Corona viruses are positive single stranded, enveloped large RNA viruses that infect people along with many animals. In 1966, they were first described by Tyrell and Byno, who cultivated the viruses from patients with common cold. Based on their morphology as spherical virions with a core shell and surface projections resembling a solar corona, they were termed corona viruses (Latin: corona = crown). They have four subfamilies; named as alpha, beta, gamma and delta corona virus that already exist. Alpha and beta are known to be arising from mammals specifically bats while gamma and delta arising from birds and pigs. The size of their genome varies between 26 kb 32 Kb. Considering the 7 subtypes of corona viruses that can infect humans; alpha corona viruses may cause asymptomatic or mildly symptomatic infections while the beta coronaviruses cause severe disease and fatalities. SARS-CoV-2 belongs to the B lineage of the beta coronaviruses and is closely related to the SARS-CoV virus. The major four structural

genes encode the nucleocapsid protein (N), the spike protein (S), a small membrane protein (SM) and the membrane glycoprotein (M) with an additional membrane glycoprotein (HE) occurring in the HCoV-OC43 and HKU1 beta-corona viruses. Like other coronaviruses, COVID-19 infects the host's cells utilizing a spike protein that connects to the angiotensin converting enzyme 2 (ACE2) receptors expressed on different human cells like the epithelial cells of the lung.

Pakistan is one the countries having highest rates of COVID-19 cases. On 26th February 2020, the first case of COVID-19 was reported in Karachi where the estimated population of Pakistan is 204.65 million. Within 45 days, on 10th April 2020, Pakistan's tally reached 4,601 cases, out of which only 727 patients recovered and 66 reported deaths. Because of unyielding effects of COVID-19, WHO provided an (SPRP) Strategic Preparedness and Response Plan to reduce further transmission of COVID-19. The plan included different approaches like Isolation and care of patients, reduction in social and economic impact through multispectral partnerships, risk communication and enhancement in the development of diagnostics, therapeutics and vaccines through priority innovation and research. Along with it, standard operating procedures (SOPs) were followed by every country to protect oneself from contact with the virus. It included standing at 6ft distance with people, washing hands, using sanitizers and wearing masks every time.

Due to limited follow ups and high transmission rate, there was still an increment in the COVID-19 cases that on 5th September 2020, the city of Karachi reported 84000 confirmed cases making up 28% of all cases present in Pakistan. On 28th October 2020, the government announced a second wave of COVID-19 in Pakistan, when a daily increase in cases reached 750 compared to 400 to 500 a few weeks ago. To control the rapid transmission, the lockdown was proposed to control and reduce the cases, which resulted in people working from home, taking classes' online, reduction in medical provision services or staying at home that led to lack of physical activity and energy expenditure among population and health care workers.

According to recent updates reported by the Government of Pakistan health advisory portal, till 28th May 2021 there were a total 854,240 confirmed cases of COVID-19 in all over Pakistan. Out of which 18,797 deaths and 752,712 recoveries have been reported. Among all regions, Sindh reported 290,756, Punjab reported 316,334 the highest confirmed cases of COVID-19, KPK 123,150 cases, Islamabad has 53,136, Balochistan has 23,186, and Azad Jammu Kashmir has 17763 while Gilgit Baltistan reported the least 5,367 cases. Though it's almost been more than a year since the virus first emerged, the majority of people are still getting exposed to the virus. The only way to reduce the virus from spreading is to have limitations on our daily life activities so we could hold back the virus. Also, to protect people from getting infected, inventing appropriate vaccines is the only way as they teach our bodies to fight the infection and is an only strategy to get rid of pandemic.

Beside hard challenges, world still managed to develop COVID-19 vaccine rapidly due to strong past researches on related virus and infections and quicker approaches to produce immunizations, vast funding that permitted firms to run numerous trials and experiments and regulators working more rapidly than normal like researchers from across the world are teaming up and introducing us various treatments, tests, and vaccines that hopefully will save huge lives. The developers of a few vaccines had declared outstanding outcomes in enormous preliminaries,

with more showing guarantee in the beginning of December. Also, on 2nd December, a vaccine made by drug giant Pfizer with German biotech firm BioNTech, turned into the first completely tried vaccination to be affirmed for emergency use. Recently, the big three - Pfizer/BioNtech, Moderna and Oxford/AstraZeneca vaccines are developed and have been approved for UK, US and Europe to use. The researchers in China have developed Sinovac, CanSino and Sinopharm vaccines and arrangements have been endorsed with different nations in Asia and South America. Sino pharm vaccine is estimated to be given to around 1,000,000 individuals in China.

The WHO, who is one of the heads of a worldwide alliance known as COVAX, the immunization pillar of the ACT-Accelerator collaboration, which is attempting to speed up the manufacturing a development of COVID-19 vaccines and guarantee that there is fair and impartial distribution to these vaccines for all nations. WHO's Strategic Advisory Group of Experts (SAGE) has given proposals about which population ought to be focused on first. These include our frontline health care workers who are at high risk of contamination, older adults, and those individuals who have co-morbidities like coronary illnesses, hypertension and diabetes as they are at high risk of death. In the second phase, as more vaccines are manufactured, they can be delivered to people having low risk of getting contaminated. Being immunized doesn't imply that we can pull out all the stops and put ourselves as well as other people in danger, especially on the grounds that it is as yet not satisfactory. Successful and effective vaccines will be a great transition but yet for a safe future to come we should not stop following SOPs and genuinely keep a distance, wear masks and stay away from crowded places.

The main journal of sport medicine and health in the world, the Editor-in-Chiefs and the Editorial Board shares an overview on the impact of COVID-19 and related physical inactivity on human health, and to share some physical activity guidelines to individuals suffering from the adverse outcomes during the pandemic and those recovering from an infection. Physical activity (PA) has demonstrated to be beneficial in improving clinical conditions that are most frequently associated with severe COVID-19. But due to the rise in the COVID-19 cases and fear of third wave, people have been ordered again to stay at home, and few countries have requested all returning travelers to self-isolate for a fourth-night. Each of these orders is proposed as a strategy to stop viruses from spreading further. While following guidelines, these actions are somehow adversely influencing people's physical activity behaviors, with additional time spent watching screens and subsequent impact on sleeping patterns, well-being and physical health. Decreased physical activity will lower mechanical load, energy expenditure, and metabolic rate which may result in a decline in physical fitness and an energy surplus. All are notable dangerous factors for future illness indications, forcing further financial burden on tomorrow's society.

A high level of sedentary behaviors with a lot of time spent on sitting and low levels of physical activity is related to increased risk of depression, cardiovascular diseases, type II diabetes and mortality rate. As it's a natural phenomenon that human physiology reacts rapidly to reduced physical activity. For instance, fourteen days of diminished physical activity prompts a decline in cardio respiratory wellness and multi-organ insulin sensitivity. One week of reduced step count significantly reduces myo-fibrillar protein synthesis rates and up regulated muscle atrophy in male adults by 91%. Also, only one week of induced sedentary behavior has adverse effects on depression and mood. Additionally, immobilization and sedentary behavior, such as TV viewing, are strong risk factors for venous thromboembolism. Despite what is generally

expected, regular physical activity and low sedentary time are related with low risk of morbidity and all-cause mortality.

The WHO recommends 150 minutes of moderate intensity or 75 minutes of vigorous intensity physical activity per week. The benefits of such periodic exercise are proven to be very helpful, especially in times of anxiety, crisis and fear. There are concerns therefore, in the context of the pandemic, lack of access to regular sporting or exercise routines may result in challenges to the immune system, physical health, including by leading to the commencement of or exacerbating existing diseases that have their roots in a sedentary lifestyle. Lack of access to exercise, physical activity and energy expenditure can also have mental health impacts, which can compound stress or anxiety. Meanwhile, individuals can be affected by multiple infections, drowsiness, lethargic, obesity and other psychological problems as well. Hence, this study is proposed to find out the impact on physical activity and energy expenditure in physiotherapy professionals and students due to COVID-19 pandemic.

2. Objective of the study

Main objective of the study is to determine the levels of physical activity and energy expenditure among physiotherapy professionals and students before and during COVID-19 pandemic.

3. Rationale of the study

The findings will be helpful to guide the physiotherapy professionals and students to stay physically active and do require energy expenditure.

4. Methodology

This section discusses the procedure used for this research. It includes study design, sampling, instrument used, data collection, data entry, data analysis, statistical tests used and description of statistical data.

4.1 Study Plan

At the beginning of the research thesis, we started with introducing the novel COVID-19 situation and how it is creating difficulties for people in everyday lives and further set up the study objectives, rationale and study plan. On the next step, we had the brief review of literature explaining how much covid-19 pandemic has affected physical activity and energy expenditure of people especially physiotherapists and physiotherapy professionals along with their mental health and made them more exposed to co-morbidities. In the third step, Researcher focused on framing a questionnaire which should be authentic and peer reviewed and made sure the questions are related to the study and easily answerable for the population. In the next step, the questionnaires were distributed to the targeted population. Then the data was analyzed by the questionnaire received back. The data analysis was done by the application of Statistical Package for the Social Sciences (SPSS) version 23. The last step included the results, discussion and recommendations.

The main objective of this study was to find out the impact of COVID-19 pandemic on physical activity and energy expenditure of physiotherapy professionals and students. This was a

questionnaire survey-based study and included close ended questions related to mild, moderate and vigorous physical activity before and during Covid-19 pandemic.

4.2 Study Design

This study is a cross sectional study which focused on finding out the impact of COVID-19 pandemic on physical activity and energy expenditure of physiotherapy students and professionals. The study design was chosen in regard to the current situation of COVID-19 and the study conduction was convenient, required less financial burden, time saving and described the benefits and effects of physical activity in the current pandemic situation.

4.3 Setting

The study was conducted in physiotherapy students and professionals from Jinnah postgraduate medical center, Dow Medical College, SBB Dewan University, Agha Khan Hospital, 3D lifestyle, Rabia Moon Trust, Liaquat National Hospital, Doctors Plaza, Ziauddin Medical University.

4.4 Study duration

The duration of study was 4 months.

4.5 Sample Size

It was estimated that keeping the 5% margin of error and 95% confidence interval, we need at least n= 300 samples. Our sample size was 308 subjects, that included Physiotherapy students and professionals= 268+40. A response rate of 73% was achieved. A total of 420 questionnaires were sent, out of which 308 were received.

4.6 Sampling Technique

Non probability convenience sampling was used for the study.

4.7 Sample Selection

The participants were randomly selected. The study's targeted population was all the physiotherapy professionals and students. Clinicians, academicians and researchers were also included in the study.

INCLUSION CRITERIA

- The age range between 18 to 60 years
- People who were physically active in daily routine

EXCLUSION CRITERIA

- People who were already physically inactive due to some illnesses.
- Physiotherapy professionals or students who were not willing to spare time to fill questionnaires.

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4.8 Tool / Instrument

This is a questionnaire survey-based study so based on the International Physical Activity Questionnaire – Short Form (IPAQ-SF), the series of questions were developed for the survey to determine the physical activity and energy expenditure in the targeted population. The survey included 3 portions; the first section included questions regarding demographic data. Demographic related questions included in the survey were age, weight and gender. The second section included questions regarding physical activity before COVID-19 while the third portion consisted of questions related to physical activity after COVID-19 situation.

4.9 Validation of Questionnaire

The questionnaire used in this study is a short form of International Physical Activity Questionnaire (IPAQ-SF) which is already a validated survey tool. So the final survey through which data was conducted included 22 questions. Eight questions were related to demographics and contact information, seven questions of IPAQ-SF for evaluating physical activity and energy expenditure before COVID-19 pandemic and last seven questions of IPAQ-SF for evaluating physical activity and energy expenditure during COVID-19 Pandemic.

4.10 Data Collection Procedure

The researchers framed a questionnaire and informed consent for the participants and started collecting data by sending questionnaires online through social networking sites like Facebook, WhatsApp, and Instagram and also by face-to-face interview. The online survey was administered using the online survey portal, Google forms® (Online survey services). Overall, the feedback ratio was around 70% as many people avoided filling the form online. Data collection procedure was carried out by the permission of the department of Physiotherapy, Jinnah Postgraduate Medical Centre, Karachi. Consent form was signed before filling the questionnaire. All the queries that participants had were answered by the researcher.

4.11 Calculation of physical activity and energy expenditure:

A) Estimating Physical Activity Levels;

Following the IPAQ-SF, there were 4 categories provided to classify physical activity; Vigorous activity, moderate activity, walking and sitting. Utilizing the concept of Metabolic Equivalent (MET) here, the time spent in each of the above physical activity (in minutes) was multiplied with MET of the particular physical activity. In the same way, to calculate the MET utilized in a particular week, it was multiplied with the number of days a particular physical activity was performed. In this way, MET-min/wk were determined. For estimation, MET values which were recommended by the American college of Sports Medicine (ACSM) were used; vigorous activity – 8.0 METs; moderate activity – 4.0 METs sitting 1.5 METs; and walking – 3.3 METs.

B) Estimating Energy Expenditure Levels;

The levels of energy expenditure were measured in kilocalories. One kilocalorie is the amount of energy required to increase the temperature of 1 kg of water by 1 °C. The MET was converted into kilocalorie considering ACSM's formulae; 1 kcal/min = [(METs X 3.5 mL/kg/min X body weight in kg) ÷ 1000]. Using this formula kcal/day or kcal/wk was calculated as intended for MET-min/wk.

Therefore, the exact amount of physical activity expressed in MET-min/wk and energy expenditure expressed in kcal/wk were compared before and during COVID-19 pandemic.

4.12 Data analysis procedure

First the response rate was calculated using the basic formulae; RR = [(No. of survey returned ÷ total no. of potential surveys sent out) × 100]. Data collected through 308 questionnaires was recorded and analyzed using Statistical Packages for Social Sciences (SPSS) version 23. The central tendency and dispersion of continuous variables which mainly included age and weight were expressed in mean with 95% confidence interval (CI) and mean [standard error of the mean (SEM)] in Error Bar. Categorical data were reported in frequencies as percentages and sample size (n). The test applied to compare levels of physical activity and energy expenditure before and after COVID-19 pandemic was Wilcoxon Signed Rank Test. The statistical measures used in this study are descriptive statistics and each question from the questionnaire was analyzed individually with level of significance set up to 0.05 and to minimize type 1 error.

4.13 Ethical concerns

- The questionnaire was distributed after taking approval from supervisor and students' project committee of College of Physiotherapy, Jinnah Postgraduate Medical Centre, Karachi
- Subjects were informed about the research before filling the form
- Consent was taken from all participants for voluntary participation and the use of data for research and publication purpose
- All the personal information of participants were kept confidential

5. Results

Out of 308 Participants, who participated in study (n=260, 84.4%) were females and (n=48, 15.6%) were males. The mean with 95% C.I of age of the survey participants in study was 22 (21.7 to 22.3) years. Most of the participants in study were undergraduate students of physical therapy degree program (n=244, 79.2%) while (n=24, 7.8%) were postgraduate students enrolled in physiotherapy program. (n=18, 5.8%) were physiotherapy academicians and (n=22, 7.1%) were clinical physiotherapists. The mean weight with 95% C.I of the survey participants in study was 55.6 (54.3 to 56.9) Kg respectively.

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Table 1: Baseline Characteristics of Studied Samples (n=308)

Characteristics		N	%
Gender	**Male**	48	15.6
	Female	260	84.4
Age (Years)	**Mean (95% C.I)**	***22.0***	***(21.7 -22.3)***
Qualification	**Undergraduate Student**	244	79.2
	Postgraduate Student	24	7.8
	Physiotherapy Academician	18	5.8
	Clinical Physiotherapist	22	7.1
Weight (Kg)	**Mean (95% C.I)**	***55.6***	***(54.3 -56.9)***

The levels of Physical activity expressed as MET-min/week before and during COVID-19 pandemic is classified in Table 2 as mean (95% C.I) and as mean (SEM) in Error Bar (including sitting activity in Fig. 1 and without sitting activity in Fig. 2)

There exists statistical significance ($p < 0.01$) before and during Covid-19 pandemic in physical activity and energy expenditure.

Table 2: Physical activity (MET-min/week) before and during COVID-19 pandemic

Physical Activity	Before COVID-19 pandemic (MET-min/week)[a]	During COVID-19 pandemic (MET-min/week)[a]	Mean Percentage (%)	p-value [b]
Vigorous	1512.9 (1372.8-1653)	1105.3 (995.1-1215.4)	-27	<0.01*
Moderate	830.2 (762-898.4)	499.7 (455.9-543.5)	-39.9	<0.01*
Walking	661.8 (606.6-717)	531.7 (493-570.4)	-19.7	<0.01*
Sitting	281.9 (268.6-295.3)	383.8 (353-414.6)	+36.2	<0.01*
Total	3005 (2771.8-3238.2)	2136.8 (1993.9-2279.6)	-28.9	<0.01*
Total WoS	3287 (3053.4-3520.6)	2520.7 (2364.1-2677.3)	-23.4	<0.01*

Note:

Abbreviation: WoS – Without sitting
a - Expressed in Mean (95% Confidence Interval).
b - Wilcoxon Signed Rank test.

Results show a significant decrease in each category of physical activity (MET-min/week) during COVID-19 pandemic as compared to before COVID-19 with a P-value of <0.01.

Fig. 1. Physical activity (MET-min/week) before and during COVID-19 pandemic expressed in mean and standard error of the mean

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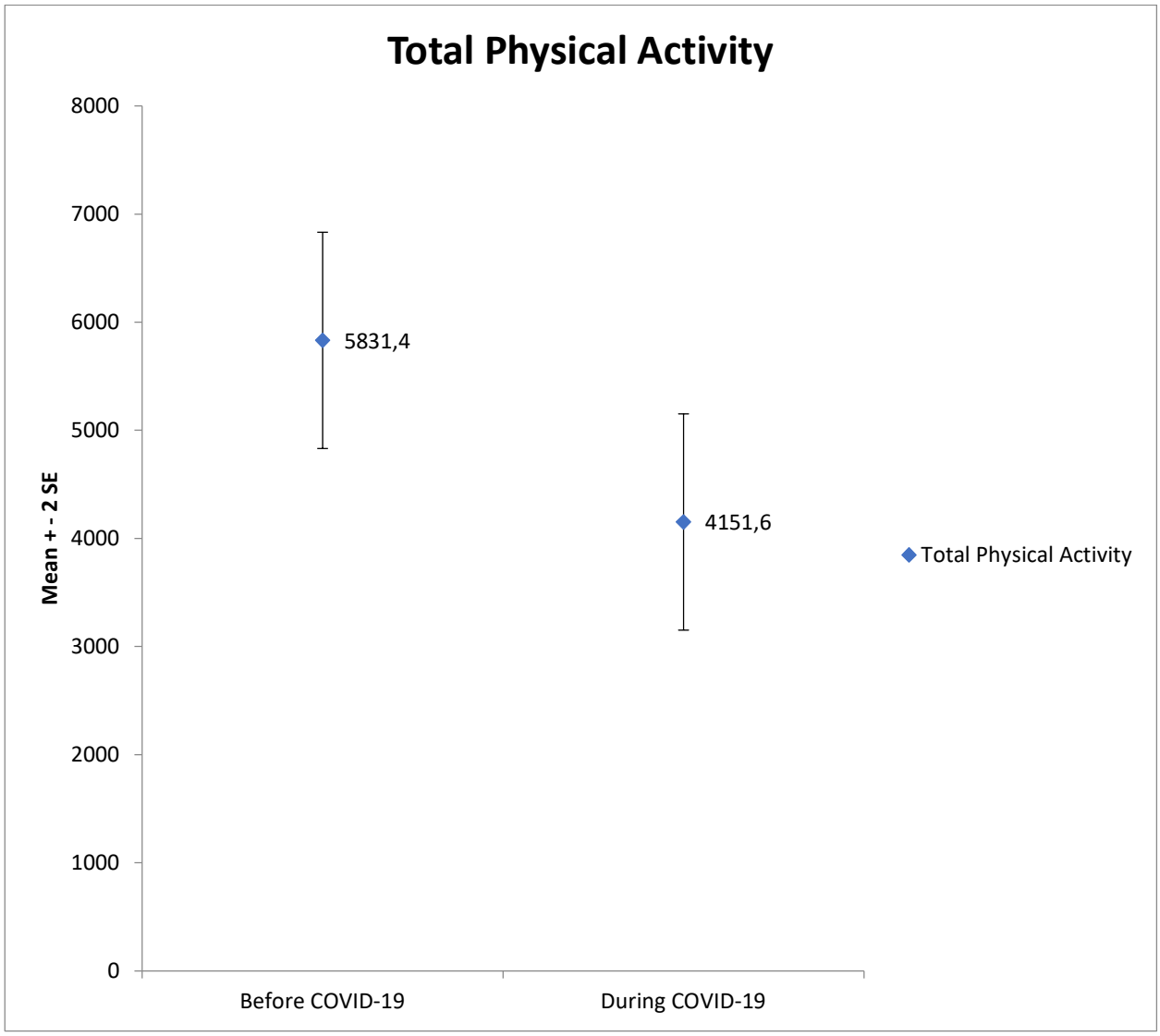

Fig. 2. Physical activity (MET-min/week) before and during COVID-19 pandemic (Without Sitting Activity) expressed in mean and standard error of the mean

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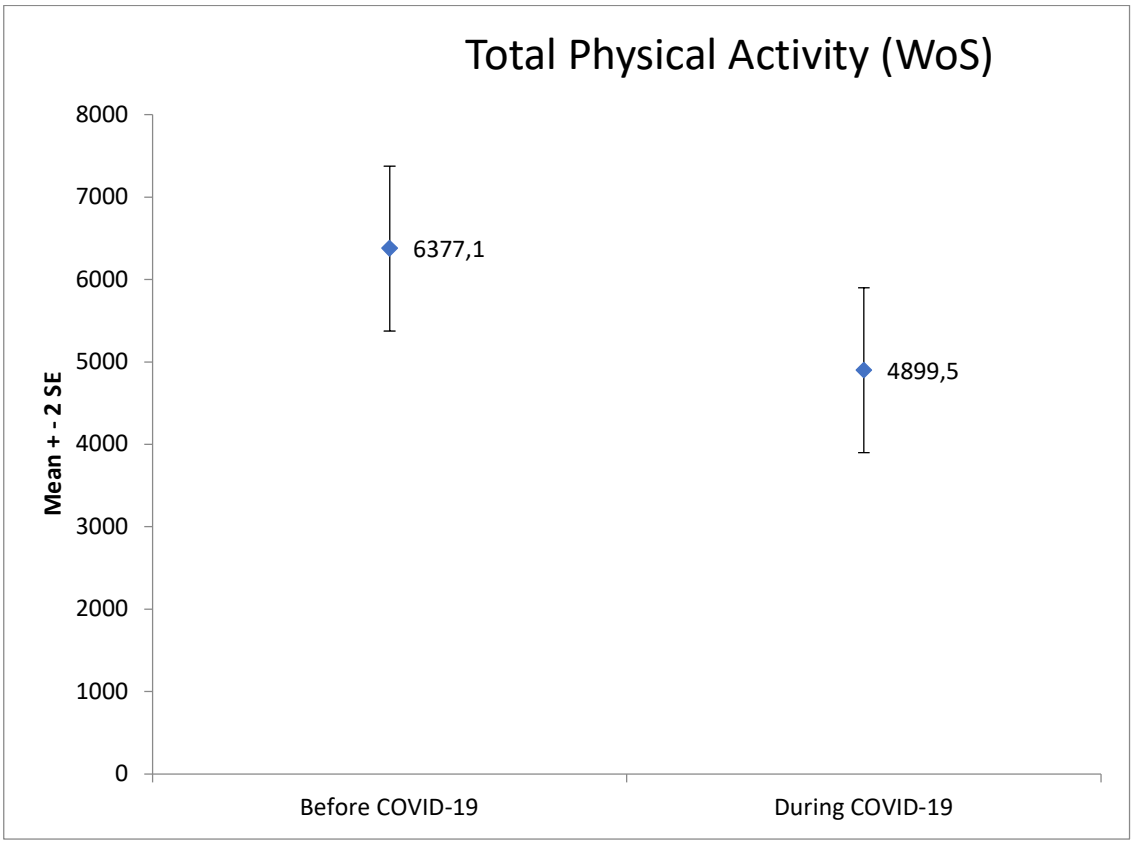

While energy expenditure (kcal/week) before and during Covid-19 pandemic period is classified in Table 3 and as mean (SEM) in Error Bar (including sitting activity in Fig. 3 and without sitting activity in Fig. 4).

Table 3: Energy Expenditure Before and During COVID-19 pandemic:

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Energy	Before COVID-19 pandemic (kcal/wk)[a]	During COVID-19 pandemic (kcal/wk)[a]	Mean Percentage (%)	p-value [b]
Vigorous	2935.8 (2651.7-3219.9)	2120.2 (1909.1-2331.3)	-27.8	<0.01*
Moderate	1613.3 (1473-1753.6)	994.1 (897-1091.2)	-38.4	<0.01*
Walking	1282.2 (1170.2-1394.1)	1037.3 (957.4-1117.1)	-19.1	<0.01*
Sitting	545.7 (517.5-573.8)	747.8 (683.8-811.8)	+37.1	<0.01*
Total	5831.4 (5349.8-6313)	4151.6 (3865-4438.2)	-28.9	<0.01*
Total WoS	6377.1 (5891.9-6862.3)	4899.5 (4582.2-5216.7)	-23.2	<0.01*

Note:

Abbreviation: WoS – Without sitting
a - Expressed in Mean (95% Confidence Interval).
b - Wilcoxon Signed Rank test.

Fig. 3. Energy Expenditure before and during COVID-19 pandemic expressed in mean and standard error of the mean

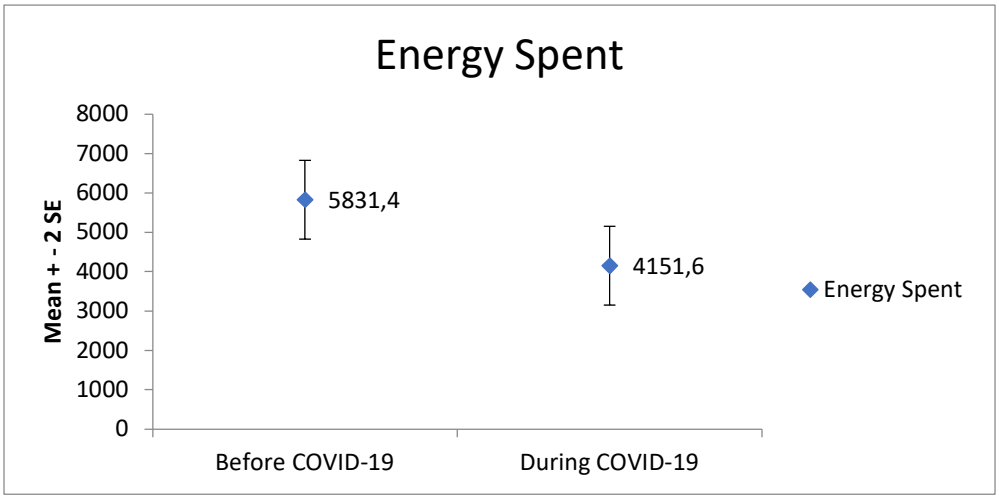

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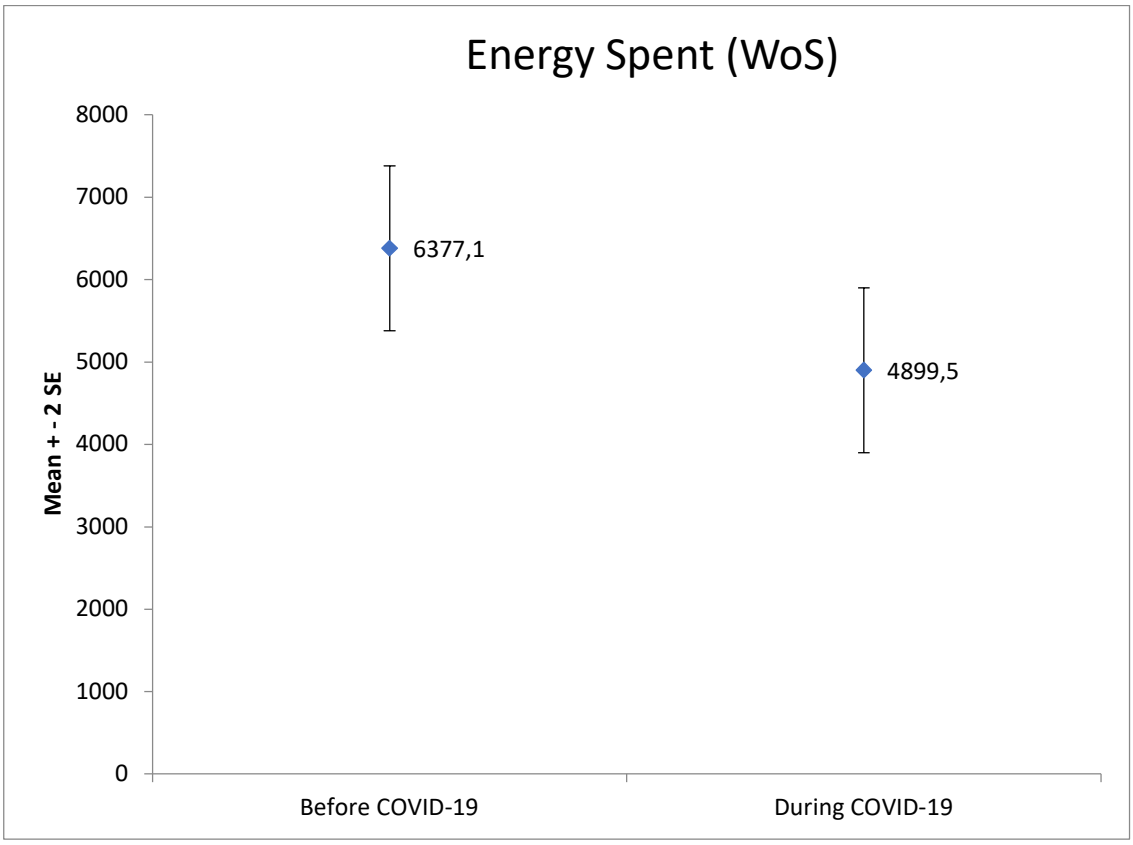
Fig. 4. Energy Expenditure before and during COVID-19 pandemic (Without Sitting Activity) expressed in mean and standard error of the mean



Again, results show a considerable decrease in energy expenditure among participants during COVID-19 pandemic as compared to before Covid-19 with p-value of <0.01.

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6. Discussion

The aim of this study was to find out the impact of COVID-19 pandemic on physical activity and energy expenditure among physiotherapy professionals and students. A total of 308 physiotherapy professionals and students participated in the study. Non-probability convenience sampling was used for the study. Required data was conducted through a survey (IPAQ-SF) and questionnaire was administered through online Google forms and filled physically by half of the participants. These methods were used to collect data in a short period of time. The survey took only 10 minutes to complete. The data was analyzed to compare the results of physical activity and energy expenditure before and during COVID-19 pandemic. IPAQ-SF is a modified survey and it classifies physical activity in four categories; Vigorous, moderate, sitting and walking. The study proved an alternate hypothesis as there is a significant difference ($p < 0.01$) in physical activity and energy expenditure among physiotherapy professionals and students during the COVID-19 pandemic as compared to before COVID-19 pandemic.

Considering the study findings, it reported that physiotherapy professionals and students performed more physical activity before the COVID-19 Pandemic (1512.9 MET-min/wk) and vigorous activity decreased (-27.0%) as compare to during the pandemic (1105.3 MET-min/wk). Moderate physical activity is also reduced by (-39.9%) during pandemic (499.7 MET-min/wk), as compared to before pandemic period (830.2 MET-min/wk). Walking was also affected (-19.7%) during the pandemic period (531.7 MET-min/wk), as compared to the walking before pandemic (661.8 MET-min/wk). The sitting activity was also affected and increased (+36.2%) during pandemic (383.8 MET-min/wk) as compared to the sitting activity before pandemic (281.9 MET-min/wk). Overall, physical activity was higher before COVID-19 pandemic (3005 MET-min/wk) and decreased (−28.9%), compared to the physical activity during pandemic (2136.8 MET-min/wk) with significance difference of ($p<0.01$). Without considering sitting component, the physical activity was decreased (-23.2%) during the pandemic (2520.7 MET-min/wk) as compared to the before pandemic (3287 MET-min/wk). Statistically significant differences were noted in individual component of physical activity (Vigorous, moderate, walking, and sitting) before and during COVID-19 Pandemic ($p < 0.01$) as shown in Table 2.

Energy expenditure is also decreased before and during the COVID-19 pandemic. Energy expenditure during the lockdown period was (2120.2 kcal/wk), which is almost decreased (−27.8%) as compared to the energy expenditure following vigorous activity before the lockdown period (2935.8 kcal/wk). Energy expenditure followed by moderate physical activity was also decreased (−38.4%) during the pandemic (994.1 kcal/wk) as compared to the before pandemic (1613.3 kcal/wk). Energy expenditure during walking was decreased (−19.1%) during the pandemic (1037.3 kcal/wk) as compared to before pandemic (1282.2 kcal/wk). Energy expenditure during sitting was increased (+37.1%) during pandemic period (747.8 kcal/wk) as compared to before pandemic (545.7 kcal/wk). Overall energy expenditure was decreased (−28.9%) during the COVID-19 pandemic (4151.6 kcal/wk) as compared to before pandemic (5831.4 kcal/wk). Statistically significant difference was noted in the individual components of physical activity (Vigorous, Moderate, Walking, and sitting) before and during lockdown period ($p < 0.01$). Energy expenditure before and during COVID–19 pandemic were 6377.1 (5891.9–6862.3) kcal/wk and 4899.5 (4582.2–5216.7) kcal/wk; $p < 0.01$ were observed without sitting component. There was approximately 23.2% reduction of energy expenditure, as shown in Table 3.

A previous study was conducted to find out the levels of physical activity of university students. Study included 333 participants who were specializing in physical education and physical therapy with an average age of 21 years. Their results were a bit compatible with our study that the analysis of physical activities (Vigorous MET and Total Physical activity MET) were obtained showing significant differences between results and genders. They collected data using IPAQ-SF too. Vigorous MET was found (2867.34 MET-min/wk) in their study. The moderate physical activity calculated was (1111.12 MET-min/wk). Walking MET was found to be 1395.18 MET-min/wk while the overall Physical activity MET calculated was 5343.92 MET-min/wk. Their study found male students more active as compared to female students. Women were reported to be performing less vigorous activity as compared to men.

Physical activity is considered as one of the important factors of our lives. But considering the current scenario, COVID-19 pandemic has put so many restrictions in our lives. Due to the pandemic, people are trying to distance themselves or stay at home to be safe. Office workers are supposed to work from home and physical classes of students are shifted to online. Staying at home has reflected so many drawbacks for people. Many are suffering from bad mental health due to social isolation. Even our study results showed a significant decrease in physical activity and energy expenditure of individuals due to COVID-19 pandemic, so we suppose there could be a chance of reduced immune system since lack of physical activity leads to decreased immune system. Multiple studies supported the findings showing individuals who stay at home or isolate themselves a lot are found to be very less active and report many health risk behaviors. Daily involvement in physical activity has been reported to be reducing the risk of lower respiratory tract disorders and sickness days. Lack of activity is also proven to be affecting your physiological processes including cholesterol levels, high blood pressure, cardiovascular function, obesity and insulin sensitivity. Hence, regular exercise and physical activity is recommended to boost up the immune system. Even one of the studies found that 5 minutes of regular stair running can cause an immediate increase in the number of natural killer cells. Physical activity decreases hyper-insulinaemia, improves insulin resistance and reduces the risk for diabetes and cancers. Many researchers suggested that in women, recurrence risk of cancers might be reduced by engaging more than 4.5 MET hours/week of recreational physical activity including approximately 2–3 h per week of brisk walking. Even moderate endurance exercises enhance the number of immunological indices such as T-cell count and immunoglobulin level and can enhance the immune response.

Implementing surveys online through web-based E-survey and conducting data physically alongside speed up the process of data collection. Considering the strengths of this study, it included a large sample size (n=308) and the method of collecting data was cost effective and less time consuming. The limitation of our study was an unequal distribution of physiotherapy professionals and students. Future studies could focus on other medical professionals and different populations including geriatrics and pediatrics. Also, they could focus on including other outcome measures for measuring physical activity and energy expenditure. This study highlights physical activity and energy expenditure levels among physiotherapy professionals and students before and during the COVID-19 Pandemic.

7. Conclusion

About 23.4% physical activity and 23.2% energy expenditure were decreased among physiotherapy professionals and students during the COVID-19 pandemic when compared with before pandemic results. This study can help physiotherapy professionals and students to reconsider their physical activity and energy expenditure levels and try to improve them. This study can help form the foundation for such studies in the near future in the region.

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ANNEXURE

INFORMED CONSENT FORM

I have fully explained the procedure and rationale of my study. I have asked whether any questions have arisen regarding the procedure and answered any questions to the best of my ability.

RESEARCHER'S NAME: RABEL SUNDRO

RESEARCHER'S SIGNATURE: _____

I have been fully informed as to the procedure to be followed. In signing this consent form I agree to participate in the study. I understand that I am free to refuse to participate or withdraw my consent and discontinue my participation in this study at any time. I also understand that if I have any queries the researcher will help me to understand.

SUBJECT'S NAME: _____

SUBJECT'S SIGNATURE: _____

DATE: _____

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QUESTIONNAIRE

INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE - SHORT FORM

PART-1: Demographics

Name: _____ Age: _____

Gender: _____ Weight: _____

Qualification: _____

Institute/ Workplace: _____

Email Address: _____

Contact no: _____

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PART-2: LEVELS OF PHYSICAL ACTIVITY BEFORE COVID-19

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active before and during COVID-19 pandemic. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Think about all the vigorous activities that you did before COVID-19. Vigorous physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

1. Before COVID-19 pandemic, on how many days did you do vigorous physical

activities like heavy lifting, digging, aerobics, or fast bicycling?

_____ days per week

No vigorous physical activities ---------->Skip to question 3

2. How much time did you usually spend doing vigorous physical activities on one of those days?

_____ hours per day

_____ minutes per day

_____Don’t know/Not sure

Think about all the moderate activities that you did before COVID-19 pandemic. Moderate activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

3. Before COVID-19 pandemic, on how many days did you do moderate physical

activities like carrying light loads, bicycling at a regular pace, or doubles tennis?

(Do not include walking).

_____ days per week

No moderate physical activities ----------> Skip to question 5

4. How much time did you usually spend doing moderate physical activities on one of those days?

_____ hours per day

_____ minutes per day

_____Don't know/Not sure

Think about the time you spent walking before COVID-19. This includes at work and at home, walking to travel from place to place, and any other walking that you have done solely for recreation, sport, exercise, or leisure.

5. Before COVID-19 pandemic, on how many days did you walk for at least 10 minutes at a time?

_____ days per week

No walking ----------> Skip to question 7

6. How much time did you usually spend walking on one of those days?

_____ hours per day

_____ minutes per day

_____ Don't know/Not sure

Think about the time you spent sitting on weekdays before COVID-19 pandemic. Include time spent at work, at home, while doing course work and during leisure time. This may

include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

7. Before COVID-19 pandemic, how much time did you spend sitting on a weekday?

_____ hours per day

_____ minutes per day

_____Don't know/Not sure

PART-3: LEVELS OF PHYSICAL ACTIVITY DURING COVID-19 PANDEMIC

8. During COVID-19 pandemic, on how many days do you do vigorous physical activities like heavy lifting, digging, aerobics, or fast bicycling?

_____ days per week

No vigorous physical activities ---------->Skip to question 10

9. How much time do you usually spend doing vigorous physical activities on one of those days?

_____ hours per day

_____ minutes per day

_____Don't know/Not sure

10. During COVID-19 pandemic, on how many days do you do moderate physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? (Do not include walking).

_____ days per week

No moderate physical activities ----------> Skip to question 12

11. How much time do you usually spend doing moderate physical activities on one of those days?

_____ hours per day

_____ minutes per day

_____Don’t know/Not sure

12. During COVID-19 pandemic, on how many days do you walk for at least 10 minutes at a time?

_____ days per week

No walking ----------> Skip to question 14

13. How much time do you usually spend walking on one of those days?

_____ hours per day

_____ minutes per day

_____ Don’t know/Not sure

14. During COVID-19 Pandemic, how much time do you spend sitting on a weekday?

_____ hours per day

_____ minutes per day

_____Don’t know/Not sure

Thank you so much for participation!

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