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Evaluating Physical Activity And Energy Expenditure Among Physiotherapy Students And Professionals To Study Long Term Impact Of Covid-19 Lockdown - A Cross Sectional E-Survey.

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ABSTRACT

BACKGROUND : Coronavirus disease - 19 (COVID-19) spread throughout the world and to stop and control the rapid infection of COVID-19 lockdown was the best option. Social isolation affected individual's lives by greater reduction in their physical activity. The study sought to assess the changes in physical activity (PA) and energy expenditure among physiotherapy professionals and students before Covid lockdown, during Covid-19 lockdown and at present.

AIM: To evaluate physical activity and energy expenditure among physiotherapy students and professionals to study long term impact of Covid-19 lockdown.

METHOD: It was based on a retrospective online survey conducted in May 2022. 103 physiotherapy professionals and students filled the Google form and recalled their PA-related information at three stages: before COVID-19 , during lockdown (2020), and at present (2022). Freidman's test was used to assess the distribution of different activities across the phases of time. If $p<0.05$ for Freidman's test Post Hoc test was done to find out which group's mean differ from one another.

RESULT: Total PA and energy expenditure at present is significantly more than during lockdown but is still significantly less than the total PA and energy expenditure before lockdown. Whereas vigorous and moderate PA at present is not significantly more than vigorous and moderate PA during lockdown but is significantly less than vigorous and moderate PA before lockdown.

CONCLUSION: COVID-19 lockdown measures have had a negative long-term impact on PA levels (MET-min/week) and energy expenditure (Kcal/week). The results also show that even after a long time has passed since the lifting of Covid-19 lockdown restrictions, the PA is significantly less than PA before Covid lockdown indicating a decreased awareness of PA among physiotherapy professionals and student

Abbreviation- PA= Physical activity, MET- Metabolic equivalent, Wos- Without sitting

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Keywords: Physical activity, Energy expenditure, Covid 19-lockdown.

INTRODUCTION

Over the past half century scientific data have continued to accumulate indicating that being physically inactive or unfit has major health consequences throughout the lifespan and is vital component of a comprehensive approach to chronic disease prevention & health promotion(1).Conversely, sedentary behaviour and lack of daily physical activity might cause health related problems like dyslipidemia (2), microvascular dysfunctions and problems related to peripheral insulin resistance (3). Studies regarding health-related adverse effects of physical inactivity have defined it as fourth leading risk factor, accounting for six of world deaths (4). Severe Acute Respiratory Syndrome Coronavirus-2 (SARS- Cov- 2), the causative pathogen for COVID-19 first emerged in Wuhan, China in December 2019 and by March 2020 it had been declared a virus (5).

On the evening of 24th March 2020, the govt Of India ordered a nationwide lockdown for two days, Limiting movement of the whole 1.38 billion population of India as a fortification against COVID-19 pandemic in India (6). On 1st May, the govt. Of India extended the nationwide lockdown further by period of time until 17th May and on 11th May, the lockdown was further extended until 31st May by the National Disaster Management Authority (7,8). On 30 May, it absolutely was announced that lockdown restrictions were to be lifted from then onwards, while the continuing lockdown would be further extended until 30 June for less than the containment zones. Services would be resumed in an exceedingly phased manner ranging from 8 June. it absolutely was termed as "Unlock 1.0". In 2021, because of the most important wave of infection within the country second lockdown was announced.

As of May 22’ , per official figures India has the second highest no. of confined cases in world (after USA) with 43,119,112 and third highest no. of COVID-19 deaths(after USA & Brazil) at 5,24,201 deaths (9) (10).

Studies reported that staying home for a chronic time might result in sedentary behaviour, like spending longer on sitting activities ,playing games watching TV, decreased regular outdoor activities and exercise ends up in increased risk of chronic health conditions (11).The pandemic has also negatively impacted psychological state globally , including increased loneliness resulting from social distancing (12) and depression and violence from lockdowns (13), some studies examining impacts of COVID-19 pandemic on PA and sedentary behaviour have revealed that PA had substantially decreased while sedentary time had significantly increased during the lockdown in children and adolescents(14,15,16). Meanwhile, individuals may be full of multiple infections, drowsiness, lethargic, obesity and other psychological problems thanks to physical inactivity. Therefore, it's essential to know the potential physical inactivity because of lockdown COVID19 among physiotherapy professionals and students who propagate physical activity

OBJECTIVE OF THE STUDY:

- To calculate the physical activity of the sample population before covid lockdown, during covid lockdown and during the present time.
- To calculate the energy expenditure of the sample population before covid lockdown, during covid lockdown and during the present time .
- To find the change in physical activity among the sample population by comparing the PA levels .
- To find the change in energy expenditure among the sample population by comparing the Energy expenditure across all the 3 phases.

METHODOLOGY

Materials and Methods

1. RESEARCH DESIGN

Study design- Cross sectional (retrospective) study
Sample size- 103
Sample size calculation was done using Estimation of population mean formula.

$$n=\frac{4\delta^2}{E^2}$$

Study duration- 2 Month
Sampling Method- Convenient sampling
Sample population- Physiotherapy professionals and students.

2. MATERIALS

- **IPAQ-SF** (International Physical Activity Questionnaire- Short Form)
- Laptop, Mobile.

INCLUSION CRITERIA

- Physiotherapy Interns
- Physiotherapy UG and PG students.
- Physiotherapy clinicians, Practitioners and academicians.

EXCLUSION CRITERIA

- Improper filling of the questionnaire.
- First year students of physiotherapy department.
- Age> 60 years

PROCEDURE

- **Ethical statement**

The web-based open E-survey research was approved by institutional ethics commission of Dr. Ulhas Patil College Of Physiotherapy (Maharashtra University of Health Sciences, Nashik), Jalgaon, Maharashtra. The aim of the survey, introduction and about the length of the survey was added within the web-based open E-survey. A successful return of completed survey was considered as consent by the participant although separate statement for consent was asked within the survey questionnaire.

- **Survey Development**

A series of questionnaires were created for the survey, based on International Physical activity questionnaire-short form (IPAQ-SF) for young and middle-aged adults. The Survey contained four sections. The first section include a series of demographic questions, the second section of survey comprised of physical activity before the lockdown period, the third section of survey comprised of physical activity during the lockdown period and the fourth section comprised of physical activity in present time. Demographic related questions included in the survey were name, age, weight, gender, qualification and whether or not the subject was physically active before lockdown.

- **Internal consistency of the questionnaire**

The questionnaire used within this study was built from IPAQ-SF. The questionnaire focused on three different moments, regarding before and through COVID-19 confinement restrictions and through the current time. Specifically, it consisted of 36 items, assessing demographics (1-3), anthropometrics (4), qualification (5), PA before Covid-19 lockdown (7-16), PA during Covid-19 lockdown (17-26) and PA at present (27-36). The introduction page of the questionnaire provided a brief description of the study and its main purposes. Since the questionnaire collected information of three different moments, to assess the validity of the obtained answers referring to past behaviour, question 6-“Before COVID-19 lockdown, what amount of days/week did you train regularly?” (with options starting from 0 to 7 days per week)-; according to the American College of Sports Medicine (ACSM) physical activity guidelines, people are considered sedentary if they train from 0 to 2 days per week, while they're considered physically active if they train from 3 to 7 days per week. Therefore, a replacement variable, “physically active”, with possible answers “Yes” or “No” was derived.

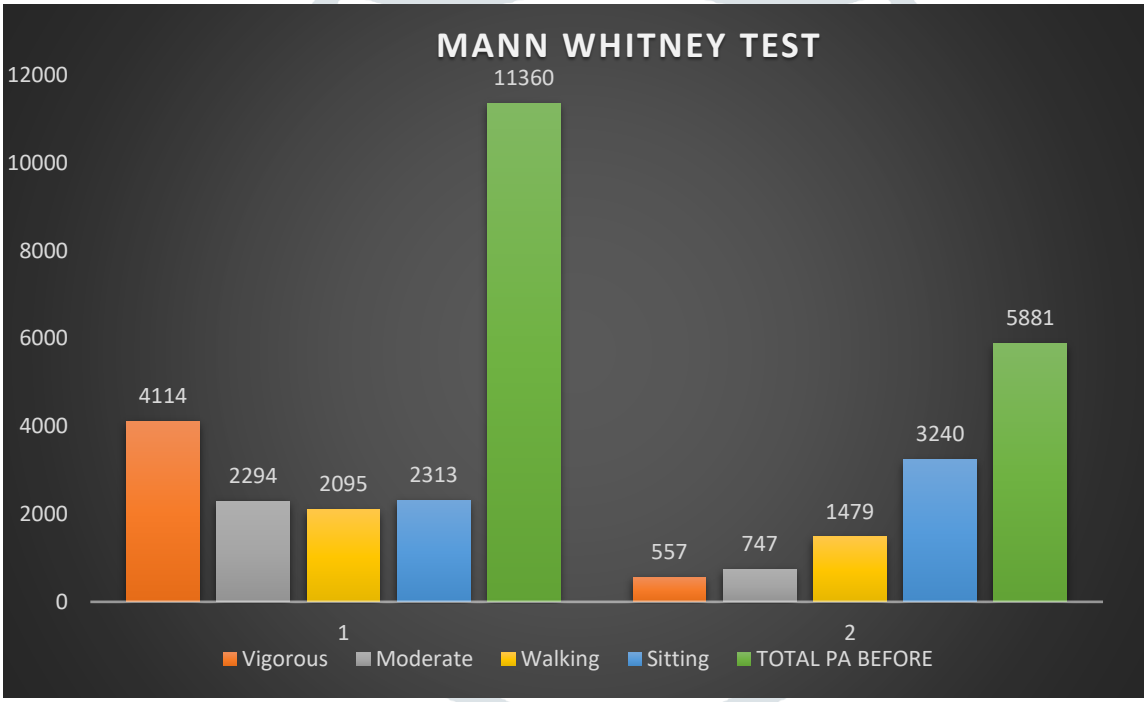
Afterwards, to test if people where honest in their answers, a Mann–Whitney test was performed comparing the Total PA level before the lockdown between sedentary and physically active individuals. e. If the respondents were honest in their answers, and if the questionnaire was sensitive in detecting the of Total PA before the COVID-19 lockdown, sedentary people should even have reported less pre-confinement PA than physically active people. From the results reported in Table 1, sedentary respondents reported an

amount of the intensity of Total PA that's significantly under physically active respondents, indicating

that they were honest in indicating their PA before quarantine.

TABLE 1

	PHYSICALLY ACTIVE MET min/week (n=30)	SEDENTARY MET min/week (n=73)	Significance
Vigorous	4114	557	<0.001
Moderate	2294	747	<0.001
Walking	2095	1479	<0.001
Sitting	2313	3240	<0.001
TOTALPA BEFORE	11360	5881	<0.001



- **Application of Survey**

The study was executed by sending the link (https://forms.gle/SwzwvLGcQdpMKse76) to Physiotherapy students and professionals through social networking sites like WhatsApp, and Instagram. The Survey was administered using the web survey portal, Google forms® (Online survey services). As people are mostly active on social networking sites and in comparison to frequently checking e-mails, social networking sites were used for circulating the survey questionnaire

- **Calculation of physical activity and energy expenditure**

  - Calculating Physical Activity levels.

In accordance with IPAQ-SF, the physical activity was classified into four categories which are, vigorous activity, moderate activity, walking and sitting. From the time spent (in minutes) for every of the above physical activity, utilized MET for the actual physical activity was estimated by multiplying MET with time spent. Similarly MET utilized for particular week was calculated by multiplying with the quantity of days within which the following physical activity performed. Thus, MET-min/week was estimated. For estimating MET-min/week, the subsequent MET values recommended by the American college of medical sports medicine (ACSM) were used, sitting – 1.5 METs; walking – 3.3 METs; moderate activity – 4. METs and vigorous activity – 8.0 MET.

  - Calculating energy expenditure

Energy spent during the physical activity was expressed in kilocalorie. One kilocalorie is that amount of energy required to extend the temperature of 1 kg of water by 1 °C. MET is converted into kcal/ min in guidance with ACSM's formulae, 1 kcal/min = [(METs X 3.5 mL/kg/min X weight in kg) ÷ 1000]. kcal/week was calculated as adopted for MET-min/ week from this basic formula. Thus, the quantity of physical activity expressed in MET-min/week and energy spent expressed in kcal/week were compared before the lockdown and through the lockdown period and during the current time.

STATISTICAL ANALYSIS

Statistical analysis of the data obtained was performed using SPSS version 28.0.0.1. The normal distribution of the collected data was analysed by using Shapiro-Wilk test. The data was found to be not normally distributed ($p<0.05$) because of which all the test which are done further are non-parametric tests.

Descriptive statistics were calculated as mean and standard deviation (SD) for continuous variables and percentages for categorical variables.

Freidman's two way analysis of variance by ranks was performed to test the distribution of vigorous, moderate, walking, sitting, total PA and total energy expenditure levels across the three phases of time that are before covid lockdown, during covid lockdown and the present time .If $p<0.05$ for Freidman's test then post hoc test will be conducted to find out which groups mean differ from each other. Statistical significance was declared if $p < 0.05$.

RESULT

In the study, a total of 103 participants were included, of which 71 (68.9%) are students and 32(31.1%) are practicing professionals. with mean age of 22.81 ± 2.79 yrs and mean weight of 60.11 ± 14.08 kg. There are 69 females (67%) and 34 males (33%) out of which 30 (29.1%) were physically active and 73 (70.9%) were sedentary before the lockdown

The distribution to total PA and total energy expenditure (WoS- Without sitting) across the three phases was done using Freidman's test. As a result is it clearly shown in Table 3 and

Table 5 that p<0.005, meaning the distribution of PA and energy expenditure across the three phases is different. As p<0.05, post hoc test was conducted to find out which group mean differ from one another. Result is given in Table 4 and Table 6 which clearly shows that total PA and energy expenditure at present is significantly more than during lockdown but is still significantly less than the PA and energy expenditure before lockdown.

TABLE 2

GENDER	Frequency	Percent
Male	34	33
Female	69	67
Total	103	100

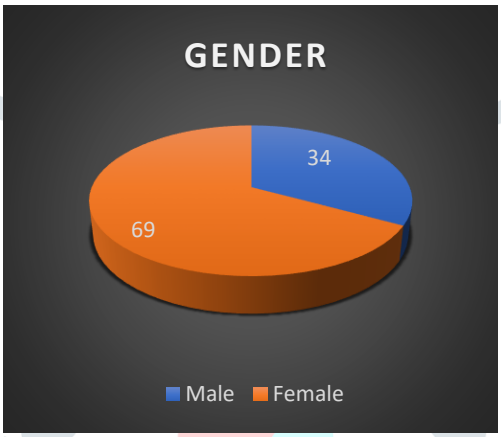


TABLE 3

	Mean	Std. Deviation	Mean rank	p value
EE BEFORE WoS	805.32	864.33	2.44	
EE DURING WoS	368.98	397.47	1.60	<0.001
EE NOW WoS	547.11	658.40	1.97	
WoS- Without Sitting				

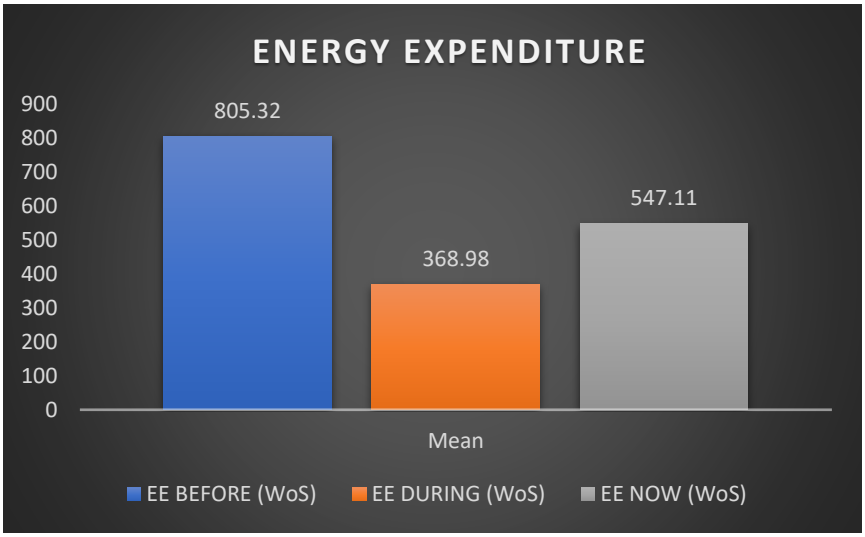


TABLE 4

POST HOC TEST	Significance
EE NOW-EE DURING	0.008
EE NOW-EE BEFORE	<0.001
EE DURING-EE BEFORE	<0.001

TABLE 5

	Mean	Std. Deviation	Mean rank	p value
PA BEFORE	3686.23	3619.13	2.44	
PA DURING	1702.37	1627.08	1.60	<0.001
PA NOW	2559.91	2831.05	1.97	

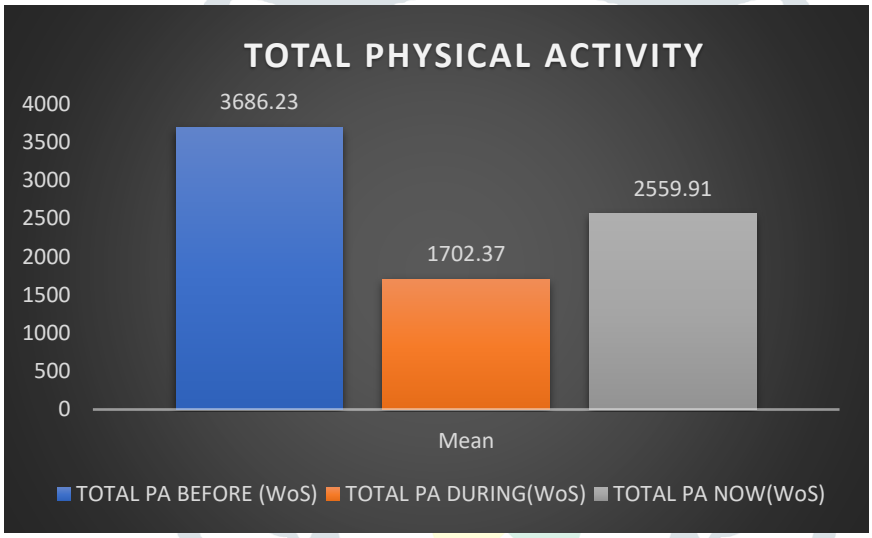


TABLE 6

POST HOC TEST	Significance
TOTAL PA NOW-TOTAL PA DURING	0.008
TOTAL PA NOW-TOTAL PA BEFORE	<0.001
TOTAL PA DURING-TOTAL PA BEFORE	<0.001

Freidman's test was also used to test distribution of vigorous PA, moderate, walking and sitting across the three phases. As a result it is clearly shown in Table 7 that $p<0.05$ across all variables. As $p<0.05$ Post Hoc test was conducted to find out which group mean differ from one another

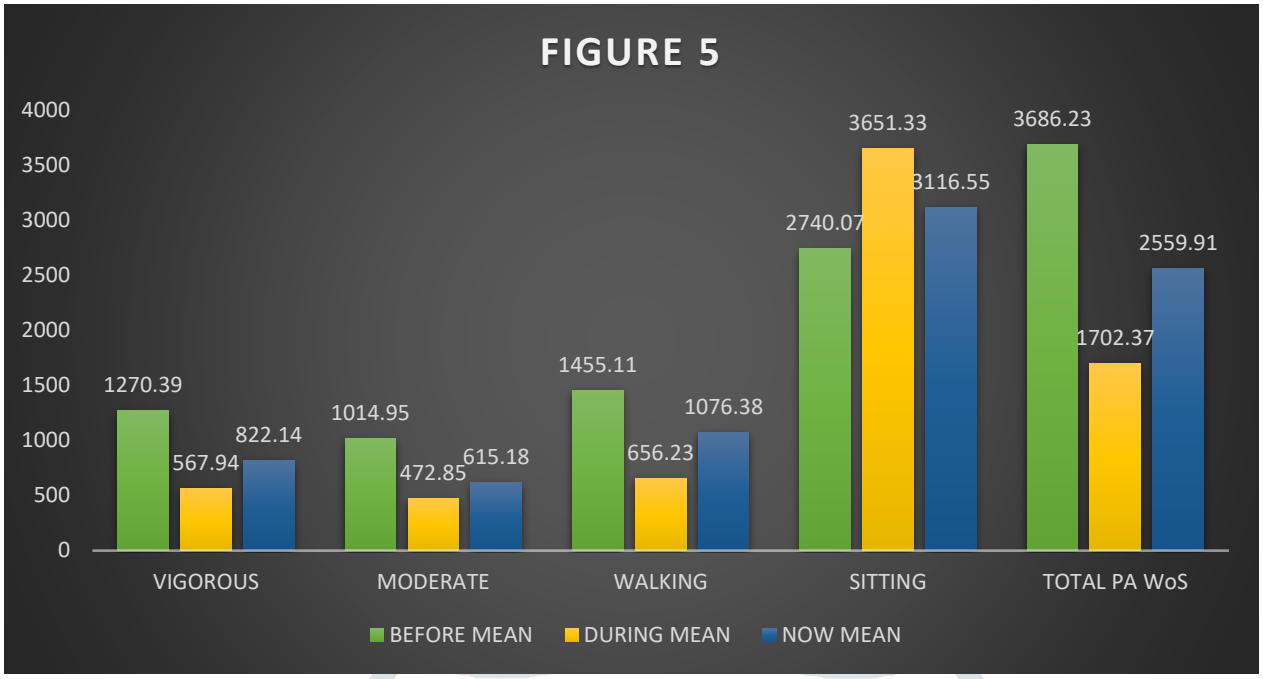


TABLE 7

	BEFORE		DURING		NOW		P Value
	MEAN	SD	MEAN	SD	MEAN	SD	
VIGOROUS	1270.39	1930.57	567.94	953.56	822.14	1626.17	<0.001
MODERATE	1014.95	1408.82	472.85	660.18	615.18	873.9	<0.001
WALKING	1455.11	1322.05	656.23	534.21	1076.38	1079.7	<0.001
SITTING	2740.07	1440.64	3651.33	1557.76	3116.55	1678.91	<0.001
TOTAL PA WoS	3686.23	3619.13	1702.37	1627.08	2559.91	2831.05	<0.001

VIGOROUS PA- According to the Post Hoc test, as seen in (Table 8) vigorous PA during lockdown and vigorous PA at present have no statistically significant difference ($p>0.05$) meaning that vigorous activities have not increased much as after covid 19 lockdown whereas vigorous PA at present is significantly less as compared to vigorous PA before Covid lockdown ($p<0.05$) (Figure 5).

TABLE 8

POST HOC TEST	Significance
VIGOROUS DURING-VIGOROUS NOW	0.88
VIGOROUS DURING- VIGOROUS BEFORE	<0.05
VIGOROUS NOW- VIGOROUS BEFORE	<0.05

MODERATE PA- As seen (Table 9), moderate PA during lockdown and moderate PA at present have no statistically significant difference ($p>0.05$) meaning that moderate activities at present has increased but not much as compared to moderate activities during

lockdown, whereas moderate PA at present is significantly less as compared to moderate PA before Covid lockdown($p<0.05$) (Figure 5)

TABLE 9

POST HOC TEST	Significance
MODERATE DURING-MODERATE NOW	0.944
MODERATE DURING- MODERATE BEFORE	<0.05
MODERATE NOW - MODERATE BEFORE	<0.05

WALKING- As seen (Table 10), walking during lockdown and walking at present have statistically significant difference ($p<0.05$) meaning that walking at present has increased significantly as compared to walking during lockdown, whereas walking at present is significantly less as compared to walking before Covid lockdown ($p<0.05$) (Figure 5).

TABLE 10

POST HOC TEST	Significance
WALKING DURING - WALKING NOW	<0.05
WALKING DURING- WALKING BEFORE	<0.05
WALKING NOW - WALKING BEFORE	<0.05

SITTING- As seen (Table 11), sitting before the lockdown and sitting at present have no statistically significant difference ($p>0.05$) meaning sitting at present has increased but not much as compared to sitting before lockdown, whereas sitting during lockdown was significantly higher as compared to both before lockdown and at present.

TABLE 11

POST HOC TEST	Significance
SITTING DURING- SITTING NOW	<0.05
SITTING DURING- SITTING BEFORE	<0.05
SITTING NOW - SITTING BEFORE	0.88

DISCUSSION

The purpose of this study was to evaluate and compare the PA levels among physiotherapy professionals and students across the three phases. This study has provided several important findings. The main important finding of this study is that the PA levels has decreased significantly after Covid lockdown at present time (2559.91 ± 2831.05) as compared to before Covid lockdown (3686.23 ± 3619.13) indicating a long-term impact of Covid-19 confinement and also decreased awareness for physical activity. A small number of studies consistently found that the COVID-19 had resulted in substantial and negative changes to physical activities among adults (17,18,19,20). Our findings add to the existent literature that this trend was also found in physiotherapy professionals in students and that the impact brought by COVID-19 was not only immediate also lasted.

Similarly, decreased PA levels (vigorous, moderate, walking, sitting) and energy expenditure during home confinement were reported in physiotherapy professionals and students in other similar recent study (21). Vigorous PA at present (822.14±1626.17) and moderate PA at present (615.18±873.9) is significantly lower than Vigorous PA before lockdown (1270.39±1930.57) and moderate PA before lockdown (1014.95±1408.82), while being not significantly more compared to vigorous and moderate PA during lockdown. This is alarming and ways should be found out to mitigate the decrease in physical activity as studies have shown an inverse relationship between physical activity and poor mental health [22].

Sitting behaviour (3651.33±1557.76) was significantly higher during lockdown compared to before lockdown(2740.07±1440.64) these results are in accordance with results reported in a large- scale research representing a multi-national and multi-continental sample, where a significant increase in sitting behaviour during home confinement was reported [23].

To our knowledge, no studies had investigated the long- term impacts of Covid lockdown on PA and energy expenditure. However, a previous study examined the PA and sedentary behaviour among children and adolescents affected by the 2011 earthquake and tsunami in Japan and found that PA had significantly decreased even after 3 years of the earthquake [25]. This may be partially in line with our findings and suggests that particular monumental events could have lasting impacts on people's behaviours. Therefore, future studies may need to corroborate this and explore ways to mitigate such impacts.

CONCLUSION

Finally, based on the results, it can be concluded that COVID-19 lockdown measures have had a negative long-term impact on PA levels (MET-min/week) and energy expenditure (Kcal/week). The results also show that even after a long time has passed since the lifting of Covid-19 lockdown restrictions, the PA is more or less the same as od during Covid lockdown restrictions indicating a decreased awareness of PA among physiotherapy professionals and student. As per the results sitting is significantly reduced at present when compared to during lockdown indicating that Covid lockdown had no major significant effect on sitting for long-term.

LIMITATIONS

- Our PA data is self-reported, therefore there may be a self-reporting bias.
- Pre-lockdown and during lockdown behaviour is retrospective, which comes with clear limitations in terms of recall bias.
- Unequal distribution of Physiotherapy professionals and students.

SUGGESTIONS

- Further studies should be done with larger sample size.
- Further studies should focus on different sample population like engineering students, other healthcare population, geriatric population.
- Further studies should focus on using different outcome measures to measure physical activity.

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