

## PHYSICAL ACTIVITY LEVEL AND ITS CORRELATION WITH QUALITY OF LIFE AMONG UNDERGRADUATES IN UNIVERSITY OF PERADENIYA DURING COVID-19 PANDEMIC

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### Abstract

**BACKGROUND:** Physical Activity (PA) has shown to have positive influence on quality of life (QOL) and health. PA has been reported to reduce among young adults during university life and it has reduced drastically due to the current pandemic and restrictions. Knowing the importance of PA and that it reduces during university life and is worsened further due to the pandemic, the purpose was to assess physical activity and QOL during the pandemic among undergraduates of University of Peradeniya, Sri Lanka during COVID 19. **METHODS:** This was a descriptive cross-sectional online study. Three hundred and eighty-seven undergraduates of University of Peradeniya were recruited. The sample was selected by proportionate random sampling from each Faculty of the University. IPAQ short form questionnaire was used to assess PA and SF-36 was used to assess QOL. The data obtained from the two questionnaires were scored according to the standard criteria. **RESULTS:** Of the 387 responses included in the study, the highest number of participants 195 (50.4%) were in the Low Physical Activity Level (PAL) category whereas, the lowest number of participants 60 (15.5%) were found to be in the high PAL category based on MET value from IPAQ questionnaire. There was no significant correlation between Low PAL scores and the 8 domains of QOL assessed by SF-36. There was a significant weak positive correlation between the energy/fatigue ( $r$  value = 0.293,  $p < 0.05$ ) and role limitation due to physical health domains ( $r$  value = 0.210,  $p < 0.05$ ) with moderate physical activity level. There was significant moderate negative correlation between pain and high physical activity level ( $r$  value = -0.416,  $p < 0.05$ ). **CONCLUSIONS:** Most undergraduates were in the low physical activity category. Involvement in PA had a positive influence on physical and psychological domains of QOL. This further emphasizes the importance of involvement in PA.

**Keywords:** Health, Physical Activity, University Students, Quality of Life, pandemic

### I. INTRODUCTION

Healthy lifestyle is the most vital element of human life. Attempts to answer the question concerning health can be found in ancient myths, religions, and philosophy. Modern health concepts are based on views of ancient Greek philosophers: Plato and Aristotle. "Health is not absence of a disease but absolute physical, psychological and social well-being" and other modern theories claim risk and stress as natural parts of life [1].

Many factors act together to affect the health of individuals and communities. It is determined by their circumstances and environment. These factors are place of living, the state of environment, genetics, income, education level and relationships with friends and family and all of these have considerable impact on health [2]. In contrast, factors like access and use of health care services often have less impact on health. Among the factors, physical activity (PA) is a major one that influences health [2]. It affects increasing different indicators of Quality of Life (QOL) and there is a positive relationship between those two components [3,4]. QOL is considered as a key benefit of PA and as a motivator. It is a

multidimensional construct which includes several domains such as physical, psychological, environmental, and social domains [4,5].

University students pass through an important phase of their lives where they are known to experience several stressors, such as change of residence, increased responsibility, peer pressure, and the different kinds of work schedules during that period [6,7]. Number of University students is rising all over the world, with no exception in Sri Lanka. It is essential to study the health status and related factors in such population and health promotion among them is a key imperative have variety of health problems [8].

A positive relationship between PA and QOL in young adults, mainly in university students has been observed. The recommended level of PA by WHO has beneficial impact on quality of life. When assessing different domains of life in relation to the presented PA levels, many possible differences are notified. Highly active students display high quality of life more often than other respondents [9]. Students with high levels of MET have higher total QOL than university students at other levels of MET [10]. Although, there are research about PA level among undergraduate students, there are no published evidence to evaluate the PA level and quality of life among University students in Sri Lanka [11].

Physical Activity (PA) has shown to have positive influence on quality of life, whereas, decreased PA and sedentary lifestyle create greater short-term and long-term health problems [10]. PA has been reported to reduce among young adults during university life [12]. Moreover, it has reduced drastically due to the current pandemic and the changes and restrictions brought by it [13]. The researchers thought it important to assess and have quantitative data published specific to the study population, so that PA and QOL can be enhanced among university undergraduates. Therefore, the present study aimed to determine PA and QOL and to assess the correlation between the two among undergraduates of University of Peradeniya, Sri Lanka.

## **II. MATERIALS AND METHODS**

Sample size was calculated based on Slovin's Formula for a total of 11152 undergraduates studying in the 09 faculties of the University of Peradeniya. The number of total participants estimated was 387. Physical Activity was assessed using the IPAQ short form questionnaire and QOL was assessed using the SF-36 questionnaire. A total of 596 completed responses were obtained. Proportionate random sampling was implemented, such that proportionate sample was selected from each faculty and a total of 387 responses were selected for data analysis. Details of participants are presented in Table 1.

## **III. STATISTICAL ANALYSIS**

Data was first assessed for normality. The data obtained for physical activity and quality of life was not normally distributed. Hence, bootstrapping was used as a method of normalizing the data.

Descriptive statistics of PA and QOL score for the subjects of the 09 faculties, gender was computed and presented as mean and standard deviation. Physical Activity Level (PAL) was presented as percentage for the 03 different categories (low, moderate, and high) based on MET value. The PA and QOL scores were compared between gender using Independent Sample T Test. The scores between subjects of faculties were compared using ANOVA. Correlation between the 03 PA categories (low, moderate, and high) and the 08 domains of QOL (Physical Functioning, Role limitations due to physical health, Role limitations due to emotional problems, Energy/ Fatigue, Emotional wellbeing, social functioning, Pain and General Health) was analyzed using Pearson's Correlation Coefficient Test. P- Value less than 0.05 was considered significant.

## **IV. RESULTS**

### **4.1 Physical Activity Category**

The details of participants of the study are presented in Table 1. Of the 387 responses included in the study, the highest number of participants 195(50.4%) were in the Low Physical Activity Level PAL (Physical Activity Level) category whereas, the lowest number of participants 60(15.5%) were found to be in the high PAL category. There were 132(34.1%) participants in the moderate PAL category (Fig. 1).

### **4.2 Physical Activity based on Faculty and Gender**

The results revealed the highest mean total IPAQ score of  $2054 \pm 4110$  MET-minutes/week was seen in participants of Faculty of Science whereas, participants of Faculty of Medicine showed the lowest mean total IPAQ score of  $1099 \pm 1370$  MET-minutes/week. Faculty of Agriculture had a mean total IPAQ score of  $1886 \pm 2189$  MET-minutes/week, Faculty of Allied Health Sciences a score of  $1523 \pm 1307$  MET-minutes/week, Faculty of Arts a score of  $1525 \pm 3178$  MET-minutes/week, Faculty of Dental

1688± 2514 MET-minutes/week, Faculty of Engineering a score of 1249 ± 2186 MET-minutes/week, Faculty of Management a score of 1431 ± 1734 MET-minutes/week, Faculty of Medicine a score of 1099 ± 1370 MET-minutes /week, Faculty of Science a score of 2054 ± 4110 MET-minutes/week and Faculty of Veterinary a score of 1606± 3023 MET-minutes/week. Further, in Table 2, there was no significant difference in the PA scores between the participants of the 09 faculties.

According to the results, male undergraduates showed a high mean total IPAQ score of 1921± 3456 MET-minutes/week compared to female undergraduates with a mean total IPAQ score of 1350± 2411 MET-minutes/week. According to Table 3 the p-value of Levene's test for equality of variances is 0.037 which is <0.05 it indicated that equal variance is not assumed. Accordingly, p-value to be considered is 0.086 indicating that there was no significant difference in the PA scores of males and females.

#### **4.3. Quality of Life based on Faculty and Gender**

The highest mean total SF-36 score of 540± 126 was seen in the subjects of Faculty of Medicine while, the lowest mean total SF-36 score of 454 ± 124 was observed among subjects of Faculty of Engineering. Faculty of Agriculture had a mean total SF-36 score of 519 ± 118, Faculty of Allied Health Sciences a score of 482 ± 129, Faculty of Arts a score of 474 ± 132, Faculty of Dental 483± 109, Faculty of Engineering a score of 454 ± 124, Faculty of Management a score of 501± 124, Faculty of Medicine a score of 540± 126, Faculty of Science a score of 496 ± 145 and Faculty of Veterinary a score of 478 ± 145. However, there was no significant difference in the Quality-of-Life scores between the participants of the 09 faculties as seen in Table 4.

Males showed a higher mean total SF-36 score of 500± 121 compared to females with a mean total SF-36 score of 481 ± 137, the p-value of Levene's test for equality of variances is 0.101 which is greater than 0.05 which indicates that equal variance was assumed. Accordingly, the p-value to be considered is 0.159, which indicates that there is no significant difference in the QOL scores of males and females as shown in Table 5.

#### **4.4 Correlation between Physical Activity and Quality of Life**

According to the results, there was no significant correlation between Low PAL scores and the 8 domains of QOL. There was a significant weak positive correlation between the energy/fatigue (r value = 0.29, p<0.05) and role limitation due to physical health domains (r value = 0.210, p<0.05) with moderate physical activity level. There was significant moderate negative correlation between pain and high physical activity level (r value = -0.416, p<0.05) it is displayed in Table 6.

## **V. DISCUSSION**

Results of this study showed that 195 participants (50.4%) were in the low PA category, 132 (34.1%) were in moderate PA category and 60 (15.5%) were in the high PA category. According to the current findings most of the undergraduates of University of Peradeniya were in the low PA category, implying that most undergraduates did not involve in PA according to the guidelines for adults. Contrarily, a study which was conducted to explore the degree of PA among 409 undergraduates in Malaysia reported that majority of the students were active (74.1%) and only a small percentage of undergraduates were less active (25.9) [14]. Physical activity level is stated to be associated with social media usage, academic stress, academic performance, academic factors (study habits, course of study) and especially the current situation of COVID-19 pandemic [15]. In the present study too factors such as: academic stress, media usage, time restrictions, credit load, lack of motivation and COVID-19 pandemic may be reasons for lower PAL among university students. During the time of data collection in the present study, the University was closed, and all the undergraduates were confined to home and their academics were conducted through online platform, which could be an additional reason for higher percentage of undergraduates being in the low PA category.

In the present study, male undergraduates had the highest mean total IPAQ value (1921 MET-minutes/week) compared to female students (1350 MET-minutes/week). However, there was no significant difference in the PA between males and females. Dissimilar to the findings of the present study, a study among 131 students at the University of the third age conducted by; Justyna and team in Poland found that PA was performed more often by females than males. They reported that males less frequently involved in high and moderate PAL [16]. Different motivators that affect PA in males and females is considered a reason for difference in PA level according to gender. Challenge and enjoyment are motivators for males while, women tend to be motivated by extrinsic factors like improving appearance, managing weight avoiding ill health [17].

When we consider the effect of gender on QOL, male students had a higher mean value of total SF-36 (500) than female students (480). There was no significant difference between the QOL scores between males and females. One of the reasons for differences of QOL based on gender is different

cultural and social factors that females and males have to experience. Furthermore, Manuela Schmidt had reported that females generally experienced wider range of life events and took more stress than males [17].

The findings of the present study indicating higher QOL scores among males compared to females may be due the factors like; cultural and social factors, and stress status identified in other studies. Also, the findings would also be influenced by confinement to home, during the time of data collection [18,19].

The results of the present study revealed that there was no correlation between low PAL and the 08 domains of QOL, there was weak positive correlation between moderate PAL and role limitations due to physical problems and energy/ fatigue domains. Also, there was a significant moderate negative correlation between high PAL and pain domain of QOL.

Exercises increase the pain threshold by releasing endogenous opioids and activation of spinal nociceptive inhibitory mechanisms orchestrated by the brain. Also exercise triggers the release of beta endorphins from the pituitary and the hypothalamus glands, which create analgesic effects by activating  $\mu$  opioid receptors peripherally and centrally respectively [20]. This physiological effect may be a reason for the negative correlation between high PA level and pain domain in the present study. Also, role limitations due to physical problems and pain domains related more to the physiological aspect rather than psychological aspect.

According to a previous study which was conducted on Saudi population (aged 18-60) to explore the association between PA and QOL, it was concluded that the participants' scores were significantly higher among those with high PA regarding physical functioning, role limitation due to physical health and general health [21]. These findings are like our findings and are related to physiological functional aspect rather than psychological aspect.

The present study was conducted during COVID-19 pandemic. It is assumed that COVID-19 related stressors may have further influenced PA and QOL among University undergraduates in addition to other factors. The additional stressors could be frustration because of the loss of daily routine, frustration because of study disruption and perception of living area with higher prevalence of COVID-19 cases.

The findings of the study reveal that the PA level among undergraduates of University of Peradeniya is very low and needs immediate attention. There is need to implement strategies to motivate and increase involvement in PA even during confinement which is possible within a house or hostel premises. Which in turn will help to enhance quality of life and health of the undergraduates and prevent complications associated with lack of physical activity.

## VI. CONCLUSIONS

Most undergraduates were in the low physical activity category. Involvement in PA had a positive influence on physical and psychological domains of QOL. This further emphasizes the importance of involvement in PA. This

### **Conflict of Interest:**

The authors have no conflict of interest to state.

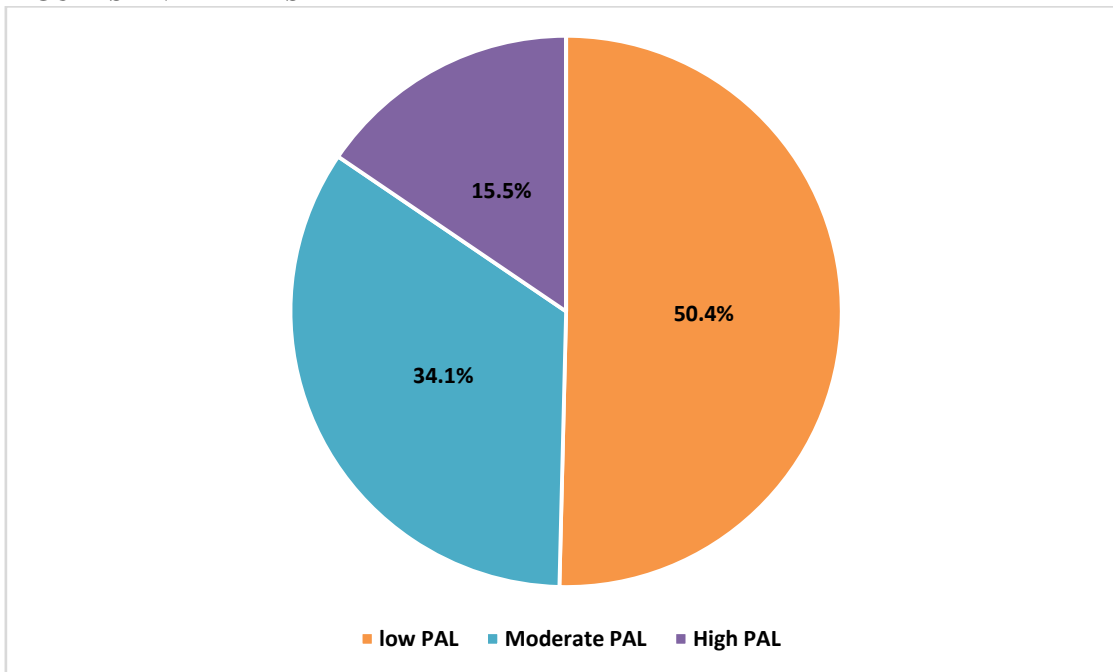
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**FIGURES AND TABLES**



**Figure 1: Percentage of participants in 03 levels of Physical Activity Category**

**Table 1: Details of participants of the study**

Faculty	Males	Females	Total
Agriculture	11	22	33
Allied Health Sciences	7	15	22
Arts	25	117	142
Dental	3	7	10
Engineering	39	13	52
Management	8	13	21
Medicine	17	23	40
Science	25	32	57
Veterinary	3	7	10
<b>Total population</b>	<b>138</b>	<b>249</b>	<b>387</b>

**2: Comparison of Total IPAQ scores for each Faculty presented in MET-minutes/weeks**

Sum of squares	Df	Mean Square	F	Sig
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<b>Between Groups</b>	31643178.39	8	3955397.299	0.486	0.866
<b>Within Groups</b>	3075010217	378	8134947.664		
<b>Total</b>	310665339	386			

The results revealed that there was no significant difference in the PA scores between the participants of the 09 Faculties.

**Table 3: Comparison of mean total IPAQ scores based on gender is presented in Met-minute/weeks**

		Levene's Test for Equality of Variances		T- test for Equality of Means						
		F	Sig.	T	df	Sig. (2-tailed)	Mean difference	Std.Err or Difference	95% Confidence Interval of the Difference	
				Lower	Upper					
<b>Total IPAQ</b>	Equal variances assumed	4.38	0.03	1.90	385	0.05	571.2	300.1	18.7	1161.1
	Equal variances not assumed			1.72	212.3	0.08	571.2	331.5	82.2	1224.7

According to the results the p-value of Levene's test for equality of variances is 0.037 which is <0.05 it indicates that equal variance is not assumed. Accordingly, p-value to be considered is 0.086 indicating that there is no significant difference in the PA scores of males and females.

**Table 4: Comparison of mean Total scores of SF-36 for each faculty**

	Sum of Squares	Df	Mean Square	F	Sig.
<b>Between Groups</b>	31643178.39	8	3955397.299	0.486	0.866
<b>Within Groups</b>	3075010217	378	8134947.664		
<b>Total</b>	3106653396	386			

The results reveal that there was no significant difference in the Quality of Life scores between the participants of the 09 faculties.

**Table 5: Comparison of mean Total SF-36 scores based on gender**

		Levene's Test for Equality of Variances		T- test for Equality of Means						
		F	Sig.	T	Df	Sig. (2-tailed)	Mean difference	Std.Error Difference	95% Confidence Interval of the Difference	
				Lower	Upper					
<b>Total SF-36 scores</b>	Equal variances assumed	2.70	0.101	1.41	385	0.15	19.65	13.92	7.72	47.04
	Equal variances not			1.46	313.50	0.14	13.44	13.44	6.78	46.10

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assumed

According to the results the p-value of Levene's test for equality of variances is 0.101 which is greater than 0.05 which indicates that equal variance was assumed. Accordingly, the p-value to be considered is 0.159, which indicates that there is no significant difference in the QOL scores of males and females.

**Table 6: Correlation between 03 categories of PA and 8 domains of QOL**

QOL Domains	Low PAL		Moderate PAL		High PAL	
	r value	p value	r value	p value	r value	p value
<b>Physical Functioning</b>	.107	.138	.096	.272	-.085	.521
<b>Role limitations due to physical health</b>	-.063	.384	.210*	.016	-.232	.074
<b>Role limitations due to emotion problems</b>	-.013	.852	.077	.383	-.133	.312
<b>Energy/ Fatigue</b>	.076	.293	.293**	.001	-.205	.117
<b>Emotional well being</b>	.093	.195	.124	.157	-.170	.195
<b>Social functioning</b>	-.014	.841	.070	.426	-.196	.134
<b>Pain</b>	-.089	.215	.073	.404	-.416**	.001
<b>General Health</b>	-.020	.779	.143	.101	-.237	.068

\*Correlation is significant at the 0.05 level

\*\*Correlation is significant at the 0.01 level