

Original Article

# Association of Fatigue Level and Physical Activity among University Students: A Cross-Sectional Survey

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**Conflict of Interest: None.**

Hanif S., et al. (2024). 4(1): DOI: <https://doi.org/10.61919/jhrr.v4i1.675>

## ABSTRACT

**Background:** Fatigue is a common complaint among adults worldwide, with an estimated 20% experiencing persistent symptoms. Physical activity is recognized as a beneficial behavior with the potential to alleviate feelings of fatigue and enhance energy levels. However, the relationship between physical activity and fatigue among university students remains underexplored.

**Objective:** This study aimed to assess the association between physical activity levels and fatigue among university students, providing insights into the potential of physical activity as a non-pharmacological intervention for fatigue mitigation.

**Methods:** A descriptive cross-sectional study was conducted at the University of Lahore's Islamabad campus, involving 206 participants aged 17 to 25 years. After securing approval from the Institutional Review Committee (IRC)/Ethical Review Board (ERB), data were collected using the Fatigue Assessment Scale (FAS) and the International Physical Activity Questionnaire (IPAQ). The sample size was determined using the Slovin formula, with a confidence interval of 95% and a margin of error of 0.05. Non-probability convenience sampling was employed. Data analysis utilized SPSS version 25, employing Chi-square tests to examine the association between physical activity levels and fatigue.

**Results:** The study comprised 41.3% male and 58.7% female participants. Results indicated that higher levels of physical activity were associated with lower levels of fatigue. Specifically, 38.8% of participants reported no fatigue, 54.9% reported mild to moderate fatigue, and 6.3% reported severe fatigue. Physical activity status revealed that 18.9% of participants had low, 48.1% had moderate, and 33% had high levels of physical activity. The Chi-square test demonstrated a significant association between physical activity levels and fatigue ( $X^2 = 23.13$ ,  $P = 0.00$ ).

**Conclusion:** The findings underscore a significant inverse relationship between physical activity levels and fatigue among university students, suggesting that engaging in higher levels of physical activity may reduce fatigue levels. This study contributes to the understanding of physical activity as a viable approach to fatigue management in young adults.

**Keywords:** Fatigue, Physical Activity, University Students, Fatigue Assessment Scale, International Physical Activity Questionnaire, Non-pharmacological Intervention, Energy Levels, Descriptive Cross-Sectional Study.

## INTRODUCTION

Fatigue is a prevalent symptom encountered in primary healthcare settings, significantly impairing individuals' capacity to perform effectively in professional environments, participate in family interactions, and maintain social relationships (1). This condition prompts healthcare professionals to investigate a myriad of potential contributors, encompassing lifestyle factors, physical health conditions, psychological disorders, and the adverse impacts of various treatments (2). Such a comprehensive assessment is crucial for identifying the underlying causes of fatigue. The capacity to maintain high levels of concentration and engagement in tasks, both physical and mental, is vital for human functioning and plays a pivotal role in our daily lives, work, and educational pursuits (3). Engaging in prolonged motor or cognitive activities triggers a series of interconnected physiological and psychological processes,

collectively referred to as "fatigue." This phenomenon can significantly limit performance, affecting both physical abilities and cognitive functions (4).

Physical activity, defined as any bodily movement produced by skeletal muscles that require energy expenditure, encompasses a range of movements, including those related to leisure, transportation, and work (5). Engaging in moderate to vigorous physical activity is particularly significant for enhancing overall health. In the context of fatigue, studies have highlighted an intriguing observation: individuals initially experiencing high levels of fatigue who increase their physical activity levels tend to show a marked reduction in fatigue over time (6). This finding suggests a positive correlation between heightened physical activity and the alleviation of fatigue among those starting with high fatigue levels. Conversely, for individuals with minimal or no initial fatigue, the relationship between physical activity, gait speed, and fatigue appears to be significant, indicating that the impact of physical activity on fatigue levels may vary based on the individual's baseline fatigue (7).

The distinct roles of physical function in the context of physical activity and fatigue, contingent upon an individual's initial fatigue levels, underscore the importance of personalized interventions (2, 8). For those grappling with significant fatigue, increasing physical activity levels presents a viable strategy for mitigating fatigue over time. This insight is particularly relevant for developing tailored approaches to alleviate fatigue through enhanced physical activity (9).

While there is an abundance of literature on the association between fatigue levels and physical activity, much of this research has focused on populations with specific diseases. The current study aims to explore this association within a young and healthy demographic, specifically university students, to determine whether fatigue is related to physical activity levels in this group (10). Understanding the impact of exercise on the well-being of students could yield valuable insights into potential improvements in academic performance, mental health, and overall quality of life. This knowledge could inform universities and individuals about the significance of integrating physical activity into student routines, promoting healthier lifestyles among this population (11).

## MATERIAL AND METHODS

This study employed a descriptive cross-sectional design, conducted at the University of Lahore's Islamabad campus over a period of six months, from March to August 2023. Institutional Review Committee (IRC) / Ethical Review Board (ERB) approval was secured from the University of Lahore, Islamabad Campus (IRB-IIUI-FAHS/DPT/1022-1134), ensuring adherence to ethical guidelines and the Declaration of Helsinki for research involving human subjects (12).

The sample size was determined using the Slovin formula, setting a confidence interval (CI) at 95% and a margin of error (a-error) at 0.05. This formula,  $n=N/(1+Ne^2)$ , where  $n$  is the sample size,  $N$  is the actual population, and  $e$  is the margin of error, facilitated a calculated approach to sample size determination. A non-probability convenience sampling technique was employed for participant selection, with data collection conducted through the use of standardized questionnaires (11).

The Fatigue Assessment Scale (FAS), a 10-item scale, was utilized to evaluate symptoms of fatigue among participants. Responses were gathered using a five-point Likert-type scale ranging from 1 ("Never") to 5 ("Always"), with items 4 and 10 being reverse-scored (13). The total scores ranged from 10, indicating the lowest level of fatigue, to 50, indicating the highest level of fatigue. The scale's results were also found to correlate significantly with the fatigue-related subscales of other measures. The International Physical Activity Questionnaire (IPAQ) served as the tool to assess physical activity levels, where scoring was based on calculating the total MET-minute per week as a measure of energy expenditure. The MET values for walking, moderate, and vigorous activities (usually 3.3, 4, and 8, respectively) were multiplied by the minutes spent in each activity category, and these values were then summed to obtain the total MET-minutes per week (14).

Participants included university students aged between 17 to 25 years, of any gender, who did not have any history of trauma in the past six months or common comorbid conditions such as diabetes, hypertension, or ischemic heart diseases that could affect fatigue levels (15).

Data analysis was conducted using SPSS version 25, with categorical data presented in frequencies and percentages. The association between fatigue levels and physical activity status was examined using the Chi-square test, with a p-value set at 0.05 to determine statistical significance (16). This methodology section outlines the comprehensive approach taken to ensure the robustness and ethical compliance of the study, thereby enhancing the validity of the findings on the association between fatigue levels and physical activity among university students.

## RESULTS

In the conducted study, the gender distribution among participants revealed a higher proportion of females (59%) compared to males (41%), as illustrated in Figure 1. This demographic snapshot underscores the gender composition of the university students participating in the study, indicating a predominant female representation.

Turning our attention to fatigue levels as assessed by the Fatigue Assessment Scale (FAS), the data delineated a nuanced spectrum of fatigue experiences among the participants. A significant portion of the sample, 38.8%, reported no fatigue, constituting the largest segment of the study population. This was followed by a majority of 54.9% of participants experiencing mild to moderate fatigue, while a smaller fraction of 6.3% encountered severe fatigue levels (Table 2). These findings suggest a predominant tilt towards mild to moderate fatigue levels among university students, highlighting the prevalent fatigue experiences within this demographic.

Furthermore, the assessment of physical activity status using the International Physical Activity Questionnaire (IPAQ) presented a diversified landscape of physical engagement among the participants. Notably, a modest 18.9% of the sample was categorized under low physical activity, whereas a substantial 48.1% engaged in moderate physical activity, and a significant 33% participated in high physical activity (Table 3). This distribution emphasizes the variation in physical activity levels among university students, with a considerable portion achieving high levels of physical activity.

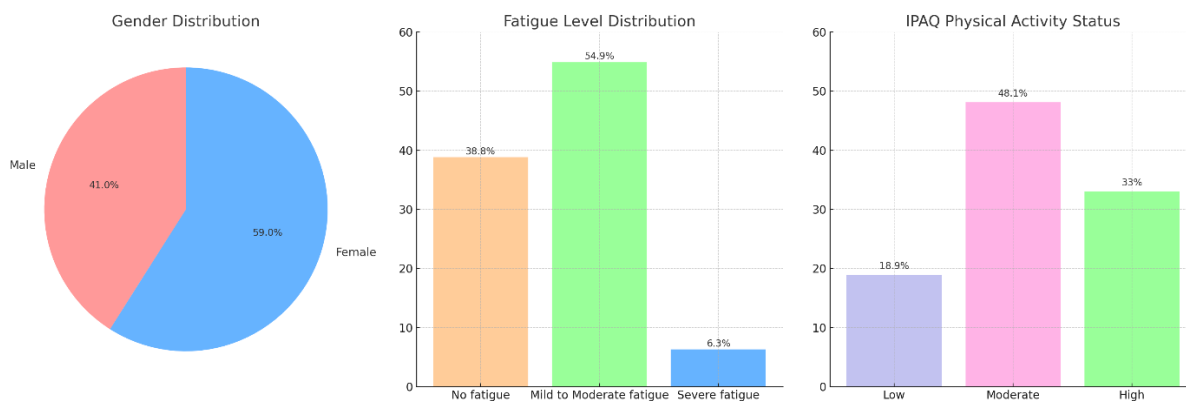


Figure 1 Analyzing Health Trends: A Comparison of Gender Distribution, Fatigue Levels, and Physical Activity Status Among Adults

Table 1: Fatigue Level Distribution

Fatigue Level	Frequency	Percentage
No fatigue	80	38.8%
Mild to Moderate fatigue	113	54.9%
Severe fatigue	13	6.3%
<b>Total</b>	<b>206</b>	<b>100%</b>

Table 2: Physical Activity Status (IPAQ)

IPAQ Category	Percentage
Low	18.9%
Moderate	48.1%
High	33.0%
<b>Total</b>	<b>100%</b>

Table 3: Association between Physical Activity Status (IPAQ) and Fatigue Levels (FAS)

IPAQ Category	No Fatigue	Mild to Moderate Fatigue	Severe Fatigue	Chi-Square (X <sup>2</sup> )	P Value
Low	8	25	6		
Moderate	32	62	5		
High	40	26	2		
<b>Total</b>	<b>80</b>	<b>113</b>	<b>13</b>	<b>23.13</b>	<b>0.00</b>

The association between physical activity levels and fatigue levels was elucidated through a Chi-Square test, yielding a Chi-Square value of 23.13 and a p-value of 0.00. This significant statistical result (Table 4) confirms a strong association between physical activity status and fatigue levels among the participants. The detailed breakdown shows that individuals with low physical activity reported higher instances of both mild to moderate and severe fatigue. Conversely, those with high physical activity predominantly fell into the no fatigue category, indicating a potential mitigating effect of physical activity on fatigue levels.

These analyses collectively reveal significant insights into the fatigue experiences and physical activity patterns of university students. The gender distribution indicates a female predominance among the participants. At the same time, the fatigue and physical activity assessments uncover a substantial engagement in moderate to high levels of physical activity and a predominance of mild to moderate fatigue levels, with a noteworthy association between increased physical activity and lower fatigue levels. This comprehensive evaluation underscores the intricate interplay between physical activity and fatigue, highlighting the potential benefits of physical engagement in mitigating fatigue among university students.

## DISCUSSION

The global prevalence of persistent fatigue among adults, estimated at approximately 20%, underscores the significance of identifying effective interventions. Physical activity emerges as a promising avenue for addressing fatigue, supported by the findings of the current study, which aimed to explore the relationship between physical activity levels and fatigue among university students (4, 9, 17). This investigation, notably the first of its kind targeting this demographic, engaged 206 participants, comprising 41.3% males and 58.7% females, to assess their physical activity and fatigue levels. The gender distribution in this study contrasts with prior research, such as Herring et al. (2018) with a male majority (58.4%) and Wenjing et al. (2022), which also had a higher proportion of male participants (66.4%) (8, 9).

The results of the present study align with existing literature, demonstrating an inverse relationship between physical activity and fatigue levels. For instance, the work of Carly Orava et al. (2018) corroborates our findings, indicating that increased physical activity is associated with reduced levels of both general and physical fatigue. Similarly, Tartibian et al. (2019) highlighted the beneficial effects of regular exercise on fatigue reduction, further reinforcing the notion that active engagement in physical activities can mitigate fatigue symptoms (2, 3, 14-16). These outcomes are paralleled by Ezati et al. (2020), which linked reduced physical activity levels with increased fatigue, suggesting that enhancing daily physical activity could alleviate fatigue (18).

This study's unique focus on university students enriches the discourse on fatigue and physical activity, contributing valuable insights into a population that is often underrepresented in this research domain. However, the study is not without its limitations (5, 7, 18, 19). The use of convenience sampling and the self-reported nature of the questionnaires may introduce bias and limit the generalizability of the findings. Furthermore, the cross-sectional design precludes causal inferences, warranting longitudinal studies to better understand the dynamics between physical activity and fatigue over time (4, 13, 14, 20).

In light of these considerations, future research should aim to employ more rigorous sampling methods and longitudinal designs to elucidate the causal relationships between physical activity and fatigue. Additionally, exploring the mechanisms underlying the observed associations could offer deeper insights into how physical activity exerts its fatigue-mitigating effects. Such investigations would not only augment the existing body of knowledge but also inform the development of targeted interventions to combat fatigue among university students and the broader population (1, 6, 11, 12, 21).

## CONCLUSION

In conclusion, the current study reinforces the premise that physical activity holds potential as a non-pharmacological intervention for fatigue. The findings suggest that university students, in particular, may benefit from increased physical activity levels in mitigating fatigue, aligning with the broader evidence base advocating for the health benefits of regular exercise. As the quest to understand and address fatigue continues, integrating physical activity into daily routines emerges as a viable strategy for enhancing well-being and academic performance among students, highlighting the importance of promoting active lifestyles within this and other populations.

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