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# PHYSICAL ACTIVITY CHARACTERISTICS AMONG OVERWEIGHT AND OBESE STUDENTS AT THE UNIVERSITY OF MEDICINE AND PHARMACY AT HO CHI MINH CITY

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## ABSTRACT

**Objectives:** The prevalence of overweight and obesity among university students is increasing, with physical inactivity being a key contributing factor. This study aimed to assess physical activity (PA) patterns among overweight and obese students at the University of Medicine and Pharmacy at Ho Chi Minh City, Vietnam.

**Methods:** A cross-sectional study was conducted on 411 overweight and obese students using the World Health Organization's Global Physical Activity Questionnaire (GPAQ). Data were entered using Microsoft Office Excel 2016 and analyzed with R Studio version 4.5.0.

**Results:** A total of 50.9% of overweight and obese students did not meet WHO's recommendations on PA for health. The proportions of low, moderate, and high PA levels were 58.9%, 13.4%, and 27.7%, respectively. Male students engaged in more physical activities and were more likely to meet recommended PA levels than female students, who tended to have more sedentary behaviours ($p < 0.05$). A non-linear trend was found between PA levels and BMI categories.

**Conclusions:** A large proportion of overweight and obese medical students did not meet WHO physical activity recommendations. The findings indicate a need for medical universities to promote travel-related and recreational physical activity to support weight management.

***Keywords:*** Overweight, obesity, university student, physical activity.

## 1. INTRODUCTION

Obesity is a complex, chronic disease defined by the excessive accumulation of adipose tissue – driven by nutritional and metabolic factors that can detrimentally affect health. The World Health Organization (WHO) recognizes obesity as a global pandemic, noting that 43 % of adults were overweight or obese in 2022. In Viet Nam, the prevalence of overweight and obesity among university students has risen markedly; at the University of Medicine and Pharmacy at Ho Chi Minh City (UMP), the prevalence of overweight and grade I obesity among first-year students was 16.4 % in females and 25.1 % in males [1].

Obesity results from an imbalance between energy intake and energy expenditure, producing an energy surplus and a positive energy balance that results in excess body weight. It is a clear risk factor for cardiovascular and cerebrovascular disease, type 2 diabetes, endocrine disorders, respiratory diseases and musculoskeletal conditions. Furthermore, overweight and obesity impair quality of life and are linked to a substantially higher risk of depression compared with healthy controls [2].

Multiple studies have shown that insufficient physical activity increases the prevalence of overweight and obesity by disrupting the balance between energy intake and energy expenditure [3]. International studies of university populations consistently demonstrate that overweight or obese students are less likely than their normal-weight peers to attain recommended activity levels. Moreover, although many studies have shown the effectiveness of structured exercise programs in weight loss among obese students, such as resistance

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band training [4] or using movement tracking apps [5], there is still a lack of baseline data on the actual physical activity levels of overweight and obese students. Understanding current activity levels is a key factor in designing appropriate, personalized, and sustainable intervention programs. However, most existing studies focus on the effectiveness of interventions without fully investigating baseline physical activity behaviors. Therefore, this study aims to assess the physical activity levels in overweight and obese students, contributing to the development of strategies for preventing and managing obesity in educational settings.

## 2. RESEARCH OBJECTIVES AND METHODS

### 2.1. Study design

- Study design: Descriptive cross-sectional study.

- Study period and setting: Data were collected from January to April 2025 at the UMP.

- Participants: All students aged 18 years or older who were enrolled at the university, classified as overweight or obese according to the 2000 IDI & WPRO body mass index criteria (BMI ≥ 23 kg/$m^2$), and who provided informed consent.

- Exclusion criteria: Pregnancy; a previous diagnosis or ongoing treatment for hypertension, cardiovascular disease, or metabolic disorders (type 1 or type 2 diabetes, dyslipidaemia, non-alcoholic fatty liver disease); current infection or other acute illness; and any psychiatric or behavioural disorder.

- Sample size: Calculated with the single-proportion formula.

$$n = Z^2_{1-\alpha/2} \frac{p(1-p)}{d^2}$$

The minimum required sample size n was determined with the single-proportion formula. The parameters were: $Z_{1-\alpha/2}$ =1,96 for a 95% confidence level (α = 0.05); allowable absolute error d = 0.05; and expected proportion P = 0.50. Because no prior estimate of P was available, a value of 0.50 was chosen to maximise the sample size. Substituting these values yielded n = 385.

### 2.2. Data collection method

Data collected comprised demographic variables (age, sex, weight, height, and body-mass index) and physical-activity information.

Height was measured with a wall-mounted stadiometer (>200 cm; smallest division, 1 cm). Weight was recorded with a Nhon Hoa mechanical scale accurate to 0.5 kg, manufactured and verified under domestic standard TCCS 10:2016/NH.

This study uses the BMI classification system developed by the International Diabetes Federation (IDI) and the WHO Western Pacific Regional Office (WPRO) in 2000. According to this classification, BMI is calculated as weight divided by height squared (kg/$m^2$), with four categories for Asian adults: Normal (18.5–22.9 kg/$m^2$), Overweight (23.0–24.9 kg/$m^2$), Obesity I (25.0–29.9 kg/$m^2$), and Obesity II (≥ 30 kg/$m^2$).

Physical activity was assessed with the GPAQ, which contains sixteen items: six on activity at work, three on travel, six on recreational activity, and one on daily sedentary time. Physical activity level is classified as low, moderate, or high according to the following criteria [6] [7]:

- High level:

≥ 3 days of vigorous activity (at work and during recreation) in a typical week AND a total physical activity MET-minutes per week ≥ 1500.

≥ 7 days of vigorous activity (commuting, at work, and during recreation) in a typical week AND a total physical activity MET-minutes per week ≥ 3000.

- Moderate level: Does not achieve the above criteria but does achieve one of the next following:

≥3 days of vigorous activity (at work and during recreation) in a typical week, at least 20 min each day.

≥5 days of vigorous or moderate activity (commuting, at work, and during recreation) in a typical week, at least 30 min each day.

≥5 days of vigorous or moderate activities (commuting, at work, and during recreation) in a typical week, at least 600 MET-minutes per week of total physical activity.

- Low level: Does not achieve the high or moderate criteria.

### 2.3. Statistical analysis

Data were entered in Microsoft Office Excel 2016 and analysed with RStudio (version 4.5.0). Group comparisons for categorical data were performed with the chi-square test or Fisher's exact test, whereas continuous data were compared with the Mann–Whitney U test. Two-tailed p values < 0.05 were considered statistically significant.

### 2.4. Ethical approval

The study was approved by the Biomedical Research Ethics Committee of the University of Medicine and Pharmacy at Ho Chi Minh City before initiation (approval No. 181/ĐHYD-HĐĐĐ, 09 January 2025).

## 3. RESULTS

Among the 411 students, males and females accounted for 53.5% and 46.5%, respectively. The median BMI was similar between females (24.8) and males (24.7), with comparable ranges. Median age was slightly higher in females (22.0) than in males (21.0). The prevalence of overweight was similar across sexes (~52%), while

obesity I was more common in females (35.1%) and obesity II was more frequent in males (15.9%).

**Table 1. Characteristics of the study sample by sex**

| | Female (N=191) | Male (N=220) | Overall (N=411) | p-value |
|---|---|---|---|---|
| **Age** | | | | |
| Median [Min, Max] | 22.0 [19.0, 31.0] | 21.0 [19.0, 26.0] | 21.0 [19.0, 31.0] | |
| **BMI (kg/m²)** | | | | |
| Median [Min, Max] | 24.8 [23.0, 37.6] | 24.7 [23.0, 35.5] | 24.8 [23.0, 37.6] | |
| **Level of BMI** | | | | |
| Over-weight | 100 (52.4%) | 115 (52.3%) | 215 (52.3%) | 0.571 |
| Obesity I | 67 (35.1%) | 70 (31.8%) | 137 (33.3%) | |
| Obesity II | 24 (12.6%) | 35 (15.9%) | 59 (14.4%) | |

Moderate-intensity recreational activity (39.7%) was the most commonly reported, followed by travel-related activity (38.4%). Male students had higher participation in both recreational (moderate and vigorous) and travel-related activities than females ($p < 0.05$).

A total of 66.4% of students engaged in at least one type of physical activity, and this proportion was significantly higher in males ($p < 0.05$).

**Table 2. Participation rates in PA categories among the study sample, by sex**

| | Female (N=191) | Male (N=220) | Overall (N=411) | p-value |
|---|---|---|---|---|
| Vigorous work | 4 (2.1%) | 4 (1.8%) | 8 (1.9%) | 1.000 |
| Moderate work | 32 (16.8%) | 47 (21.4%) | 79 (19.2%) | 0.290 |
| Travel | 57 (29.8%) | 101 (45.9%) | 158 (38.4%) | 0.001 |
| Vigorous recreation | 51 (26.7%) | 86 (39.1%) | 137 (33.3%) | 0.010 |
| Moderate recreation | 64 (33.5%) | 99 (45.0%) | 163 (39.7%) | 0.023 |
| ≥1 type of PA | 116 (60.7%) | 157 (71.4%) | 273 (66.4%) | 0.030 |

In this study, males showed a higher total amount of physical activity compared to females ($p < 0.01$). Significant gender differences were observed in recreational activity ($p < 0.001$) and travel ($p < 0.001$), with males engaging in more physical activity than females. However, we found no significant difference for work activity ($p = 0.191$). Additionally, 50.9% of the participants did not meet the WHO physical activity recommendations, with a significant gender difference ($p < 0.01$).

**Table 3. Physical-activity volume (expressed in MET-minutes per week), sedentary time, and prevalence of not meeting the WHO recommendations on PA for health, by sex**

| | Female (N=191) | Male (N=220) | Overall (N=411) | p-value |
|---|---|---|---|---|
| **Work** | | | | |
| Mean (SD) | 197.3 (595.9) | 387.3 (1053.0) | 299.0 (875.1) | 0.191 |
| **Travel** | | | | |
| Mean (SD) | 264.3 (633.6) | 470.7 (848.2) | 374.8 (762.2) | 0.001 |
| **Recreation** | | | | |
| Mean (SD) | 902.2 (1741.1) | 1210.7 (1822.6) | 1067.3 (1789.6) | 0.003 |
| **Total PA** | | | | |
| Mean (SD) | 1363.7 (2187.9) | 2068.7 (2528.7) | 1741.1 (2399.6) | 0.001 |
| **Sedentary activities** | | | | |
| Mean (SD) | 375.4 (196.3) | 447.1 (198.1) | 408.7 (200.1) | < 0.001 |
| Not meeting WHO recommen-dations | 117 (61.3%) | 92 (41.8%) | 209 (50.9%) | < 0.001 |

The table shows that males engage in physical activity more than females across all levels ($p < 0.001$),

particularly at the high level. There is a statistically significant difference in physical activity levels between BMI groups ($p < 0.001$). In the obesity I group, the highest proportion of individuals engage in high levels of physical activity (47.4%). In contrast, the obesity II group has the lowest participation in high activity levels (8.8%), with the majority maintaining low levels (17.8%). Meanwhile, the overweight group predominantly engages in low physical activity (57%).

**Table 4. Prevalence of PA levels by sex and BMI**

| Levels of total PA | Low (N=242) | Moderate (N=55) | High (N=114) | Overall (N=411) | p-value |
|---|---|---|---|---|---|
| **Gender** | | | | | |
| Female | 130 (53.7%) | 16 (29.1%) | 45 (39.5%) | 191 (46.5%) | < 0.001 |
| Male | 112 (46.3%) | 39 (70.9%) | 69 (60.5%) | 220 (53.5%) | |
| **Level of BMI** | | | | | |
| Overweight | 138 (57.0%) | 27 (49.1%) | 50 (43.9%) | 215 (52.3%) | < 0.001 |
| Obesity I | 61 (25.2%) | 22 (40.0%) | 54 (47.4%) | 137 (33.3%) | |
| Obesity II | 43 (17.8%) | 6 (10.9%) | 10 (8.8%) | 59 (14.4%) | |

Multinomial logistic regression showed that men were 3 times more likely to engage in moderate and nearly 2 times more likely in high PA levels than women. Individuals with obesity I were about 2 and 2.5 times more likely to engage in moderate and high levels of PA, respectively, than those who were overweight. However, in the obesity II group, the association between BMI status and PA levels was no longer statistically significant.

These findings revealed a non-linear trend: Compared to the overweight group, individuals with obesity I were significantly more likely to engage in moderate or high physical activity, while no clear difference was observed in the obesity II group.

**Table 5. The association between gender, obesity level, and physical activity level**

| Predictors | Outcome (PA Level) | OR | 95% CI | p-value |
|---|---|---|---|---|
| Gender (Male vs Female) | Moderate vs Low | 3.02 | 1.59 – 5.75 | < 0.01 |
| | High vs Low | 1.94 | 1.22 – 3.10 | 0.005 |
| BMI: Class I vs Overweight | Moderate vs Low | 1.97 | 1.03 – 3.78 | 0.041 |
| | High vs Low | 2.55 | 1.55 – 4.18 | < 0.01 |
| BMI: Class II vs Overweight | Moderate vs Low | 0.66 | 0.25 – 1.72 | 0.40 |
| | High vs Low | 0.61 | 0.28 – 1.31 | 0.21 |

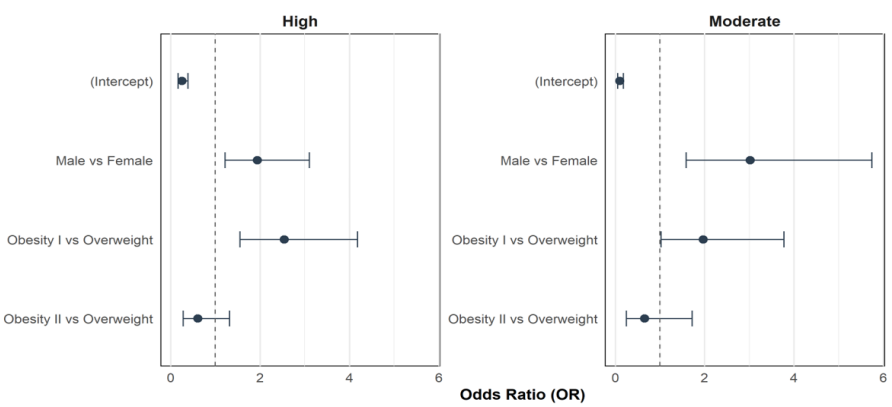


**Figure 1. Forest Plots for Predictors of Physical Activity Level**

## 4. DISCUSSIONS

### 4.1. Participation in types of physical activity

The participants were university students whose principal occupation was academic study. A small proportion had part time jobs that required moderate to vigorous physical effort, for example waiting tables, assisting in kitchens, or carrying loads. Consequently, only about 1/5 of the students reported physical activity at work. This figure is consistent with the 2023 report by Phung Chi Ninh and colleagues [8], who found that roughly 1/6 of medical students at Hanoi Medical University

engaged in moderate or vigorous activity while working.

Participation in travel-related and recreational activity was similar, with each category reported by roughly 2/5 of respondents. Nevertheless, the total energy expended during travel was less than one half of that accumulated in recreation. This pattern is likely explained by the frequent use of motorcycles, cars, and buses, which shortens travel time between dispersed sites such as rented rooms, dormitories, lecture halls, hospitals, and laboratories. Short trips on campus, to markets, or to bus stops are more often completed on foot or by bicycle. Male students reported higher participation rates and a greater total volume of travel and recreational activity than female students ($p < 0.05$). These findings indicate that programmes to raise physical activity should give particular attention to female students, especially those who are overweight or obese.

### 4.2. Physical activity level

In this study about three fifths of students with overweight or obesity reported low PA, a proportion much larger than those with moderate or high PA. This finding is consistent with the report by Herreros Irarrázabal (2024) [9], which showed a negative association between moderate and high PA and body-mass index, indicating that students who carry excess weight are generally less active than their peers with a normal BMI.

The relations between PA level and sex and between PA level and BMI category were statistically significant ($p < 0.01$). Female students were roughly 1.2 times more likely than males to report low PA, whereas their prevalence of moderate and high PA was smaller. Similar patterns were documented by Dang Thi Thu Hang (2018) [10] in Vietnamese medical students.

By BMI stratum, students in the Obesity I category (25.0–29.9 kg/m$^2$) most often reported moderate or high PA, whereas those who were overweight (23.0–24.9 kg/m$^2$) or in the Obesity II category (≥ 30.0 kg/m$^2$) predominantly reported low PA. This distribution is consistent with Acebes Sánchez (2019) [7], students who were overweight (Obesity I in the present study) were more likely to meet the recommended PA threshold than those with higher BMI.

Multinomial logistic regression showed that gender and obesity level were significantly associated with physical activity levels. Men were 3 times more likely to engage in moderate and nearly 2 times more likely in high PA levels than women. Individuals with obesity I were about 2 and 2.5 times more likely to engage in moderate and high levels of PA, respectively, than those who were overweight. However, in the obesity II group, the association between BMI status and PA levels was no longer statistically significant. Although higher obesity levels are typically expected to correlate with lower physical activity, our multinomial logistic regression revealed a non-linear trend: compared to the overweight group, individuals with obesity I were significantly more likely to engage in moderate or high physical activity, while no clear difference was observed in the obesity II group.

Medical students receive formal instruction about the health risks of excess weight, which can motivate engagement in PA. Accurate perception of weight status also promotes weight-control behaviour across weight groups, ages, and sexes [11]. Sirang (2013) [12] found that overweight and obese female students most accurately recognised their own weight status, were least satisfied with their body weight, and that 49 % were actively trying to lose weight. In the present sample, moderate and high PA were more frequent in female students with overweight or obesity than in women with a normal BMI.

### 4.3. Sedentary behaviours

Female students spent more time in sedentary behaviours than male students. In the present study the mean sitting time was almost 7 hours per day. Time spent studying medical subjects, learning foreign languages, and browsing web pages was the main contributor to total sitting time. Tran Duc Si (2021) reported that these activities occupy the largest share of students' daily schedules.

Proportion of overweight and obese students meeting the WHO physical activity recommendation In the present sample, 49.1% of students with overweight or obesity achieved the PA level recommended by the WHO. This proportion is lower than that reported in earlier studies of medical students: Phung Chi Ninh (2023) (51.8%) and Dang Thi Thu Hang (2018) (71.9%) [8][10]. Those investigations included students of all BMI categories, whereas the current study focused exclusively on students with excess weight, a group that tends to record lower PA because of psychological and health barriers.

Male students were more likely than female students to reach the recommended PA level. This sex difference mirrors global patterns. The 2024 WHO Global Report on Physical Activity indicates that the prevalence of insufficient activity is 5% higher in women than in men in most regions, and among adolescents the figures are 85% in girls versus 78% in boys. Similar disparities have been documented in studies of medical students [8] [10]. Acebes-Sánchez found an inverse relation between meeting PA recommendations and sedentary behaviour, which aligns with the present data: female students were more sedentary and less likely to meet the PA target, whereas the opposite was observed in male students [7].

Several factors limit PA in medical students, including lack of interest, high cost of participation, limited time, and heavy academic or clinical workload. Phung Chi Ninh et al. (2023) [8] also showed that economic constraints reduce PA ($p <0.05$), restricting access to recreational activities. In addition, students involved in multiple clubs reported higher PA than those who took part in one or fewer. These findings underscore the need for programmes and events that stimulate engagement

and thereby raise PA among overweight and obese students at the UMP.

### 4.4. Limitation

The limitation of this study is that the survey was conducted only among students at the University of Medicine and Pharmacy at Ho Chi Minh City, which may not be representative of all university students in Vietnam, particularly those in non-medical fields. Medical students often have a higher awareness of health and obesity-related conditions, which may lead to more active participation in physical activities compared to students from other disciplines. As a result, the physical activity levels recorded in this study may not fully reflect the general situation of overweight and obese students across universities. However, the findings could provide a basis for other universities in Vietnam and Southeast Asian countries, where obesity and physical inactivity are becoming increasingly common among students.

## 5. CONCLUSION

These findings offer valuable insights into the factors influencing physical activity participation levels, which can inform the development of targeted intervention programs aimed at improving health, particularly for students with high BMI.

## DECLARATION OF COMPETING INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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