

Prevalence of overweight and obesity among newly admitted medical students

Prevalencia de sobrepeso y obesidad en estudiantes de nuevo ingreso a medicina

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Abstract

Overweight and obesity constitute a major public health concern due to their high prevalence and their association with chronic noncommunicable diseases. University students represent a population particularly vulnerable to adopting behaviors associated with the development of excess body weight. This study aimed to determine the prevalence of overweight and obesity among first-year students enrolled in the Doctor of Medicine program and to analyze its distribution by sex. An observational, descriptive, cross-sectional study was conducted in 89 students during the August-December 2023 academic period. Body weight, height, body mass index (BMI), and waist circumference were assessed using standardized anthropometric procedures. BMI was classified according to the criteria established by the World Health Organization, and the association between sex and excess body weight was evaluated using Pearson's chi-square test. Women accounted for 60.7% of participants and men for 39.3%. Mean BMI was 24.8 ± 4.4 kg/m² (95% CI: 23.91-25.79). The overall prevalence of excess body weight was 44.9%. Excess body weight was more frequent among men than women (60.0% vs. 35.2%; $p = 0.022$). These findings highlight the need to strengthen health promotion initiatives and nutritional surveillance from the beginning of medical training.

Keywords: obesity; overweight; medical students; prevalence; body mass index

Resumen

El sobrepeso y la obesidad constituyen un importante problema de salud pública debido a su elevada prevalencia y a su asociación con enfermedades crónicas no transmisibles. Los estudiantes universitarios representan una población vulnerable a la adopción de conductas relacionadas con el desarrollo de exceso de peso. El objetivo de este estudio fue determinar la prevalencia de sobrepeso y obesidad en estudiantes de nuevo ingreso a la Licenciatura en Médico Cirujano y analizar su distribución según sexo. Se realizó un estudio observacional, descriptivo y transversal en 89 estudiantes durante el periodo agosto-diciembre de 2023. Se evaluaron peso corporal, talla, índice de masa corporal (IMC) y perímetro abdominal mediante procedimientos antropométricos estandarizados. El IMC se clasificó de acuerdo con los criterios de la Organización Mundial de la Salud y la asociación entre sexo y exceso de peso se evaluó mediante la prueba χ^2 de Pearson. El 60.7% de los participantes fueron mujeres y el 39.3% hombres. El IMC promedio fue de 24.8 ± 4.4 kg/m² (IC95%: 23.91-25.79). La prevalencia global de exceso de peso fue de 44.9%. El exceso de peso fue más frecuente en hombres que en mujeres (60.0% vs. 35.2%; $p = 0.022$). Los hallazgos evidencian la necesidad de fortalecer las acciones de promoción de la salud y vigilancia nutricional desde el ingreso a la formación médica.

Palabras clave: obesidad; sobrepeso; estudiantes de medicina; prevalencia; índice de masa corporal

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INTRODUCTION

Overweight and obesity represent major global public health challenges due to their high prevalence, increasing incidence, and strong association with noncommunicable chronic diseases, including type 2 diabetes mellitus, cardiovascular disease, several types of cancer, and premature mortality. The World Health Organization has reported that the prevalence of these conditions continues to rise across all age groups, including adolescents and young adults, imposing a substantial burden on healthcare systems and presenting a major challenge for population-based prevention strategies.

In Mexico, the magnitude of the problem is particularly concerning. The National Health and Nutrition Survey (ENSANUT) Continuous 2020-2022 reported prevalences of overweight and obesity of 23.9% and 17.2%, respectively, among adolescents aged 12 to 19 years, whereas the ENSANUT Continuous 2020-2023 documented an obesity prevalence of 37.1% among adults. These findings indicate that excess body weight is widely distributed within the Mexican population and suggest that a considerable proportion of individuals enter university with pre-existing nutritional alterations (Shamah-Levy et al., 2023; Barquera et al., 2024).

The etiology of excess body weight is complex and multifactorial, resulting from the interaction of biological, behavioral, psychological, environmental, and sociocultural factors. Determinants most consistently associated with overweight and obesity include unhealthy dietary patterns, high consumption

of ultra-processed foods, insufficient physical activity, sedentary behaviors, sleep disturbances, and chronic exposure to stress. The combined effect of these factors promotes a positive energy balance and contributes to the progressive development of excess adiposity from early stages of life (World Health Organization, 2024; Poobalan et al., 2023).

University students represent a population particularly vulnerable to adopting behaviors associated with weight gain. Transitioning to higher education is often accompanied by substantial lifestyle changes, including modifications in dietary habits, greater autonomy in health-related decision-making, alterations in sleep patterns, and increased academic and social demands. Numerous studies have shown that these changes may promote behavioral patterns characterized by reduced physical activity, increased sedentary behavior, and frequent consumption of energy-dense foods, all of which are associated with a higher prevalence of overweight and obesity among young adults (Musaiger et al., 2022; Poobalan et al., 2023).

Within this context, medical students are of special interest because, in addition to being exposed to demanding academic workloads and elevated levels of stress, they will eventually play a key role in promoting healthy lifestyles and preventing chronic diseases in the general population. Nevertheless, available evidence indicates that this group is not exempt from risk factors associated with excess body weight. Obesity has been linked to physical inactivity, poor dietary habits, sleep deprivation, and academic

stress, while a higher prevalence of overweight and obesity has consistently been observed among men compared with women (Estrada Nava et al., 2021; Li et al., 2022; Khan et al., 2024).

Beyond body mass index (BMI), body fat distribution has become increasingly important in the assessment of cardiometabolic risk. Waist circumference is a widely used anthropometric indicator for identifying central adiposity, a condition associated with insulin resistance, metabolic syndrome, and increased cardiovascular risk. Evidence suggests that abdominal adiposity may be present even among individuals with BMI values within the normal range; therefore, the incorporation of complementary anthropometric indicators provides a more comprehensive assessment of nutritional status (Albaker et al., 2021; Alharbi et al., 2023).

At the international level, recent evidence confirms that excess body weight remains a significant concern among medical students. A meta-analysis conducted by Shafiee et al. (2024) reported a high prevalence of overweight and obesity in this population, with variations attributable to geographic, sociocultural, and economic differences. Furthermore, longitudinal studies have demonstrated progressive increases in BMI throughout medical training, suggesting that the university period may constitute a critical stage for the establishment and consolidation of behaviors related to dietary practices, physical activity, and weight management (Shafiee et al., 2024; Szemik et al., 2024).

Despite the availability of national and international evidence, information regarding the nutritional status of students at the time of entry into medical school remains limited at the local level. Early characterization of the prevalence of overweight and obesity enables the identification of potentially vulnerable groups and provides evidence to support the development of institutional interventions aimed at promoting healthy lifestyles and preventing noncommunicable chronic diseases. Therefore, the objective of the present study was to determine the prevalence of overweight and obesity among first-year students entering the Doctor of Medicine program and to describe its distribution according to sex using conventional anthropometric indicators.

METHODS, TECHNIQUES AND INSTRUMENTS

An observational, descriptive, cross-sectional study was conducted among first-year students enrolled in the Doctor of Medicine program at the Faculty of Medicine of Tampico “Dr. Alberto Romo Caballero”, Autonomous University of Tamaulipas during the August-December 2023 academic term. The study aimed to estimate the prevalence of overweight and obesity using anthropometric indicators obtained at the beginning of professional training.

The study population comprised students enrolled for the first time in the first semester of the Doctor of Medicine program. Participants were selected through a non-probability convenience sampling approach that included students who attended the

institutional baseline assessment activities, voluntarily agreed to participate, and met the established eligibility criteria. A final sample of 89 students was obtained. Eligible participants were male and female students aged 17 years or older who provided informed consent. Students who did not complete the anthropometric assessments or whose information was insufficient for the planned analyses were excluded. Therefore, the findings should be interpreted as estimates applicable to the population evaluated.

The variables analyzed included sex, body weight, height, body mass index (BMI), and waist circumference. The primary outcome of interest was excess body weight, operationally defined as the presence of either overweight or obesity according to BMI classification criteria.

Anthropometric measurements were obtained by previously trained personnel following standardized procedures. Body weight was measured in kilograms using a calibrated digital scale, with participants barefoot and wearing light clothing. Height was measured using a stadiometer, with participants standing upright, head positioned in the Frankfurt plane, arms relaxed at the sides, and heels in contact with the supporting surface. BMI was subsequently calculated using the formula $\text{weight (kg)}/\text{height}^2 (\text{m}^2)$ and classified according to the World Health Organization criteria as underweight ($<18.5 \text{ kg/m}^2$), normal weight ($18.5\text{-}24.9 \text{ kg/m}^2$), overweight ($25.0\text{-}29.9 \text{ kg/m}^2$), class I obesity ($30.0\text{-}34.9 \text{ kg/m}^2$), class

II obesity ($35.0\text{-}39.9 \text{ kg/m}^2$), and class III obesity ($\geq 40.0 \text{ kg/m}^2$).

Waist circumference was measured using a flexible, non-elastic anthropometric tape placed horizontally at the midpoint between the lower margin of the last rib and the iliac crest. Measurements were recorded at the end of a normal expiration with participants standing. All assessments were performed during the first weeks of the academic term, and each participant was measured only once. The information collected was recorded using a coded identification system designed to ensure data confidentiality.

Data entry and statistical analyses were performed using IBM SPSS Statistics version 27. Categorical variables were described using absolute frequencies and percentages, whereas continuous variables were summarized using means, standard deviations, 95% confidence intervals (95% CI), and minimum and maximum values. The prevalence of excess body weight was calculated as the proportion of students classified as overweight or obese, and the corresponding 95% CI was estimated using the Wilson method. The association between sex and excess body weight was assessed using Pearson's chi-square test, and the magnitude of this association was quantified through prevalence ratios with their respective 95% CIs. Statistical significance was established at a $p\text{-value} < 0.05$.

The study was conducted in accordance with the ethical principles set forth in the Declaration of Helsinki and current national regulations governing

health research. Voluntary participation, respect for participant autonomy, and data confidentiality were ensured throughout the study. Prior to data collection, all students received detailed information regarding the objectives and procedures of the research and provided written informed consent.

RESULTS AND DISCUSSION

A total of 89 first-year medical students were included in the study, of whom 54 were female (60.7%) and 35 were male (39.3%). The mean body weight of the study population was 67.7 ± 17.2 kg, with values ranging from 44.5 to 122.0 kg. The mean body mass index (BMI) was 24.8 ± 4.4 kg/m², with a 95% confidence interval (95% CI) of 23.91 to 25.79 kg/m², and values ranging from 16.8 to 37.3 kg/m². Regarding waist circumference, the mean value was 75.8 ± 10.5 cm among women and 88.1 ± 12.2 cm among men, with corresponding 95% CIs of 73.0 to 78.7 cm and 84.0 to 92.0 cm, respectively (Table 1).

Table 1. General characteristics of first-year medical students

Variable	Result
Total participants, n	89
Female sex, n (%)	54 (60.7)
Male sex, n (%)	35 (39.3)
Body weight, mean $\pm$ SD (kg)	67.7 ± 17.2
Body weight, range (kg)	44.5–122.0
BMI, mean $\pm$ SD (kg/m ²)	24.8 ± 4.4
BMI, 95% CI (kg/m ²)	23.91–25.79
BMI, range (kg/m ²)	16.8–37.3
Waist circumference in women, mean $\pm$ SD (cm)	75.8 ± 10.5
Waist circumference in women, 95% CI (cm)	73.0–78.7
Waist circumference in men, mean $\pm$ SD (cm)	88.1 ± 12.2
Waist circumference in men, 95% CI (cm)	84.0–92.0

Source: Authors' own elaboration, 2026. Note: SD = standard deviation; BMI = body mass index; 95% CI = 95% confidence interval.

According to the World Health Organization body mass index (BMI) classification, 52.8% of students

were classified as having normal weight, whereas 31.5% were overweight, 9.0% had class I obesity, and 4.5% had class II obesity. Additionally, 2.2% were classified as underweight. Overall, 40 of the 89 participants were identified as having excess body weight, defined as the presence of overweight or obesity, corresponding to an overall prevalence of 44.9% (95% CI: 35.0–55.3) (Table 2).

Table 2. Distribution of participants according to body mass index classification

BMI Category	n	%
Underweight	2	2.2
Normal weight	47	52.8
Overweight	28	31.5
Class I obesity	8	9.0
Class II obesity	4	4.5
Total	89	100.0

Source: Authors' own elaboration, 2026. Note: BMI = body mass index.

When excess body weight was analyzed according to sex, this condition was identified in 21 of the 35 men evaluated (60.0%) and in 19 of the 54 women (35.2%). Comparison between the two groups revealed statistically significant differences ($\chi^2 = 5.28$; $p = 0.022$), indicating a higher frequency of excess body weight among male students. Furthermore, the prevalence ratio showed that men were 1.71 times more likely to present excess body weight than women (95% CI: 1.09–2.68) (Table 3).

Table 3. Excess body weight according to sex

Sex	Without excess body weight, n (%)	With excess body weight, n (%)	Total
Women	35 (64.8)	19 (35.2)	54
Men	14 (40.0)	21 (60.0)	35
Total	49 (55.1)	40 (44.9)	89

Source: Authors' own elaboration, 2026. Note: Excess body weight was defined as overweight plus obesity. $\chi^2 = 5.28$; $p = 0.022$.

The anthropometric findings showed that although normal weight was the predominant nutritional category, nearly half of the students presented excess body weight at the time of admission to the medical program. Likewise, the observed differences in waist circumference and the prevalence of excess body weight suggest a less favorable anthropometric profile among male students compared with their female counterparts within the study population.

The prevalence of excess body weight observed in the study population was 44.9%, indicating that approximately one in every two students entered medical training with overweight or obesity. This finding is of particular importance because excessive adiposity accumulated during late adolescence and early adulthood is associated with an increased likelihood of obesity persistence throughout the life course, as well as a subsequent rise in cardiometabolic risk. In this context, the results suggest that a substantial proportion of the nutritional alterations identified were already present before university enrollment, a finding consistent with the epidemiological situation reported in Mexico, where national health surveys have documented high prevalences of overweight and obesity among both adolescents and adults (Shamah-Levy et al., 2023; Barquera et al., 2024).

Although normal weight was the predominant nutritional category, overweight accounted for approximately one-third of the evaluated population, while obesity categories collectively represented more than one-tenth of participants. This pattern reflects a

substantial burden of nutritional disorders at early stages of the weight-gain continuum and may represent an important opportunity for preventive interventions before progression to more severe forms of obesity and associated metabolic complications. This interpretation is consistent with the findings reported by Szemik et al. (2024), who documented significant increases in BMI during medical training and emphasized that the university period constitutes a critical stage for the establishment of behaviors related to diet, physical activity, and weight management.

The magnitude of the prevalence observed should also be interpreted in light of the available international evidence. The meta-analysis conducted by Shafiee et al. (2024) demonstrated that overweight and obesity are highly prevalent among medical students worldwide, although considerable variation exists according to geographic, sociocultural, and economic contexts. From this perspective, the present findings confirm that medical students are not exempt from the nutritional epidemiological transition observed in the general population and support the need to strengthen preventive strategies specifically targeted to this group.

Comparison with national data provides additional context for interpreting the findings. The prevalence of excess body weight identified in the present study was comparable to that reported among Mexican adolescents in the ENSANUT Continuous 2020-2022 survey and consistent with the high prevalence of obesity observed among Mexican adults in the

ENSANUT Continuous 2020-2023 survey. Although methodological and demographic differences preclude direct comparisons, the consistency of these figures suggests that university students remain exposed to the same environmental and behavioral determinants that promote excess body weight in the general population. Therefore, training in the health sciences does not appear to provide sufficient protection against this condition (Shamah-Levy et al., 2023; Barquera et al., 2024).

One of the most relevant findings of the study was the observed sex-related difference, as the prevalence of excess body weight was significantly higher among men than among women. Furthermore, the prevalence ratio indicated that male students exhibited a 71% higher frequency of excess body weight than their female counterparts. These results are consistent with those reported by Li et al. (2022), who identified a higher proportion of overweight and obesity among male medical students, as well as with the findings of Szemik et al. (2024), who reported male sex as a factor associated with a greater likelihood of excess body weight during follow-up of university students. This observation suggests the potential contribution of biological, behavioral, and sociocultural factors that influence patterns of adiposity accumulation between men and women.

In addition, mean waist circumference was higher among men than among women, a finding of clinical relevance given that central adiposity is a recognized marker of cardiometabolic risk and has been associated with early metabolic abnormalities, insulin

resistance, and cardiovascular disease. In this regard, Albaker et al. (2021) documented associations between adiposity and cardiometabolic risk among university students, whereas Alharbi et al. (2023) highlighted the usefulness of waist circumference for identifying individuals at elevated metabolic risk, even in the absence of obesity as defined by BMI. These findings further support the importance of incorporating complementary anthropometric indicators into the nutritional assessment of young populations.

The present results also underscore the need to strengthen institutional strategies aimed at promoting healthy lifestyles from the beginning of professional training, particularly those focused on balanced nutrition, increased physical activity, reduced sedentary behavior, and the development of adequate sleep habits. This recommendation is supported by available evidence indicating that lifestyle-related behavioral factors play a central role in the development and maintenance of excess body weight among university students (Musaiger et al., 2022; Poobalan et al., 2023). Furthermore, recent studies in medical students have highlighted the influence of dietary practices, physical activity patterns, and academic stress on nutritional status (Estrada Nava et al., 2021; Khan et al., 2024).

Among the main strengths of the study is the use of direct anthropometric measurements obtained through standardized procedures by trained personnel, thereby reducing the bias associated with self-reported data. Additionally, assessments were

conducted during the first weeks of enrollment, allowing characterization of participants' nutritional status before prolonged exposure to academic demands and behavioral changes potentially associated with medical training. Nevertheless, the findings should be interpreted in light of several limitations, including the cross-sectional design, which prevents causal inference; the use of non-probability convenience sampling, which limits external validity; and the lack of information regarding dietary habits, physical activity, sleep quality, academic stress, alcohol consumption, family history, and body composition, all of which may contribute to explaining the observed differences in the prevalence of excess body weight.

Overall, the evidence generated demonstrates that excess body weight is a common condition at the time of entry into medical school and highlights the need to strengthen nutritional surveillance programs, health promotion initiatives, and chronic disease prevention strategies targeted at university students. Furthermore, these findings support the development of longitudinal and multicenter studies to evaluate changes in nutritional status throughout professional training and to identify more precisely the biological, behavioral, and environmental factors involved in the development of overweight and obesity in this population (Shafiee et al., 2024; Szemik et al., 2024).

CONCLUSIONS

Assessment of the nutritional status of first-year medical students revealed the presence of excess

body weight at the beginning of professional training, highlighting the need to consider this condition a priority within institutional health promotion strategies targeting university populations.

The findings suggest that entry into a health-related academic program occurs in a context where relevant nutritional alterations are already present. Therefore, preventive actions should be implemented early and integrated into comprehensive programs aimed at strengthening healthy lifestyle behaviors and promoting self-care practices.

Furthermore, the evidence generated provides valuable local information for the planning of university-based interventions focused on nutritional surveillance and the prevention of cardiometabolic risk factors. At the same time, it underscores the importance of conducting longitudinal studies to better understand changes in anthropometric indicators throughout medical training and to identify the determinants associated with their evolution over time.

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