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Artículo Original Cuantitativo

Anthropometric measurements for the nutritional study in first year medical students

Mediciones antropométricas para el estudio nutricional en estudiantes de primer año de medicina

Mesures anthropométriques pour l'étude nutritionnelle chez les étudiants en médecine de première année

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ABSTRACT

Introduction: there is concern about the rates of malnutrition, overweight and obesity since obesity can increase the risk of cardiovascular diseases, diabetes, colon cancer, among others. **Objective**: to characterize first year medical students of the Faculty of Medical and Life Sciences of the Da Vinci University of Guatemala according to anthropometric measurements. **Methods**: a cross-sectional descriptive observational research was carried out and weight, height, % body fat, muscle mass, body water, visceral fat, bone mass, average arm and wrist circumference were evaluated to know their

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current nutritional status. **Results**: 57% of the female sex had a healthy classification while among the males, 41.7% were obese according to % body fat; 83.3% of the females and 75% of the males had adequate body water; 90.5% of the females and 83.3% of the males had visceral fat. 3% of males had adequate visceral fat; 66.7% of females and 75% of males had inadequate bone mass; 78.6% of females and 83.3% of males had no somatic protein depletion; 57% of females had normal nutritional status and 25% of males had normal nutritional status, GI obesity and overweight%. **Conclusions**: anthropometric indicators revealed a better nutritional status in females compared to males.

Key words: bioimpedance, malnutrition, overweight, obesity

RESUMEN

Introducción: existe una preocupación, en los índices de desnutrición, sobrepeso y obesidad, ya que la obesidad puede llegar a aumentar el riesgo de enfermedades cardiovasculares, diabetes, cáncer de colon, entre otros. **Objetivo:** caracterizar a los estudiantes de primer año de medicina de la Facultad de Ciencias Médicas y de la Vida de la Universidad Da Vinci de Guatemala según mediciones antropométricas. **Métodos:** se realizó una investigación de tipo observacional descriptiva de corte transversal y se evaluó el peso, talla, porcentaje de grasa corporal, masa muscular, agua corporal, grasa visceral, masa ósea, circunferencia media de brazo y de muñeca para saber su estado nutricional actual. **Resultados:** el 57% del sexo femenino tuvo una clasificación saludable mientras que dentro de los masculinos predominaron los obesos en un 41.7% según el porcentaje de grasa corporal; el 83.3% de femeninos y el 75% en los masculinos presentaron adecuada agua corporal; 90.5% femenino y 83.3% de masculinos presentaron grasa visceral adecuada; 66.7% de mujeres y 75% de hombres reflejaron una masa ósea inadecuada; 78.6% de las mujeres y 83.3% de los hombres sin depleción de proteína somática; 57% de mujeres con un estado nutricional normal y 25% de los hombres tienen estado nutricional normal, obesidad grado 1 y sobrepeso. **Conclusiones:** los indicadores antropométricos revelaron un mejor estado nutricional en el sexo femenino en comparación a los hombres.

Palabras clave: desnutrición, obesidad, bioimpedancia, enfermedades

RÉSUMÉ

Introduction: les taux de malnutrition, de surpoids et d'obésité sont préoccupants, car l'obésité peut augmenter le risque de maladies cardiovasculaires, de diabète, de cancer du côlon, entre autres. **Objectif:** caractériser les étudiants en médecine de première année de la Faculté des sciences médicales et de la vie de l'Université Da Vinci du Guatemala selon des mesures anthropométriques. **Méthodes:** une enquête observationnelle descriptive transversale a été réalisée et le poids, la taille, le pourcentage de graisse corporelle, la masse musculaire, l'eau corporelle, la graisse viscérale, la masse osseuse, la circonférence moyenne du bras et du poignet ont été évalués pour déterminer leur état nutritionnel actuel. **Résultats:** 57% des femmes avaient une classification saine tandis qu'au sein des hommes les obèses prédominent dans 41,7% selon le pourcentage de graisse corporelle;

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83,3 % des femmes et 75 % des hommes présentaient une eau corporelle adéquate; 90,5 % de femmes et 83,3 % d'hommes présentaient une graisse viscérale adéquate; 66,7 % des femmes et 75 % des hommes présentaient une masse osseuse insuffisante; 78,6% des femmes et 83,3% des hommes sans déplétion somatique en protéines; 57 % des femmes ayant un état nutritionnel normal et 25 % des hommes ont un état nutritionnel normal, une obésité de grade 1 et un surpoids. Conclusion: les indicateurs anthropométriques ont révélé un meilleur état nutritionnel chez les femmes par rapport aux hommes.

Mots clés: malnutrition, obésité, bioimpédance, maladies

INTRODUCTION

The first-year university population is in a fundamental and decisive stage for its future, tied to the circumstances that each one faces. Within the student population there are people who dedicate themselves solely to studying, others study and work, and even there are those who are responsible for the support and care of someone else. Derived from the above, there is a risk of having an inadequate diet, either due to lack of time, stress or lack of economic resources.

Eating an inadequate diet can affect the intellectual capacity and productivity of students. Currently there is concern, not only in malnutrition rates but also in overweight and obesity rates, since obesity can increase the risk of cardiovascular diseases, diabetes, colon cancer, among others.[1]

The university population is a group that is nutritionally vulnerable, as they tend to skip meals frequently, eat at the wrong time, prefer fast food and consume alcohol frequently. So it is important to educate college students about developing proper eating habits.[2]

Children and teenagers gain weight during their growth as they increase in size, the volume of their bones, muscles and fat mass increase. However, there are 3 periods that are critical for developing obesity: the prenatal period, from 5 to 7 years of age, and in adolescence, especially if they are women.[3]

Fat is a component that participates in different vital functions of the organism and accumulates in different areas of the body. Excessive accumulation alters the lipid profile in the body and can lead to cardiovascular disease, which is considered the main cause of death and disability worldwide.[4]

The most common method for the nutritional diagnosis of an individual is the anthropometric evaluation in relation to body composition; it also provides information to determine the risk of cardiovascular diseases due to excess fat and its distribution.[5]

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Anthropometry obtains physical measurements related to values that reflect growth and development. Some parameters that are taken into account are: height, weight, skin folds, and measurements of body perimeters.[6] These measurements are used to determine body composition, nutritional status, and growth.

Height is a measurement that can be made in centimeters or inches. Adults and older children are measured standing with their head straight, using a stadiometer; infants and young children should be measured lying down on a firm and flat surface.[6]

The institutional policies for the calibration of the scales must be followed for the measurement of weight. Each time a patient passes by, the same scale must be used and weighed at the same time, wearing the same type of clothing to obtain greater precision in weight.[7,8]

The Body Mass Index (BMI) is a method to determine the adequacy of an adult's weight with respect to their height. To calculate it, we use weight and height, indicating over nutrition or under nutrition. The BMI provides information on body composition, since it provides the level of adiposity and relates it to height. It is calculated as follows: BMI = weight (kg)/height (m)2.[8.9]

Arm circumference: 50% of protein reserves are located in muscle tissue, so taking this measurement will provide us with information about those reserves. The upper arm should be measured between the shoulder and the elbow.[7,10]

Bioelectrical impedance analysis (AIB) is a technique used to analyze body composition, which is based on a higher conductivity and lower impedance of lean tissue compared to adipose tissue, which is due to the amount of electrolytes containing.[8]

This method is much more reliable when compared to BMI and skinfolds. It is a minimally invasive and fast method.[8]

Body Fat: The amount of fat a person has and the way it is distributed in the body are related to health risks. Healthy body fat ranges for men are 15-19% and 18-22% for women. A high percentage of body fat has been associated with an increased risk of disease.[8]

Visceral fat is a type of body fat that differs from subcutaneous fat, mainly found in the abdominal cavity, surrounding human organs. A certain amount of fat can support, stabilize and protect the viscera and if it is high it increases the risk of cardio-cerebrovascular disease.[8,11]

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Subcutaneous fat refers to the relationship between adipose tissue and body weight stored in the subcutaneous skin. It can be used as an indicator of body fat and thinness. Subcutaneous fat is below the dermis layer, above the fascia.[8,12]

Its main function is to maintain body temperature and store energy, so if there is too much subcutaneous fat, it tends to accumulate in the abdomen, buttocks, thighs, making the body look bloated, obese, and adversely affected.[8,12]

Bone mass refers to the weight of bone tissue in the body, which represents the health of the skeleton. Bone tissue is made up of cells, fiber and matrix, the fiber is that of bone collagen, the matrix has many solid inorganic salts. This is a parameter that is used to measure bone health.[7]

The objective of this research was to evaluate the nutritional status based on anthropometric measurements and gender, of first-year medical students at the Da Vinci University of Guatemala in the second semester of 2022.

METHOD

An observational, descriptive cross-sectional investigation was carried out. The universe was the first-year students of the Faculty of Medical and Life Sciences of the Da Vinci University of Guatemala. No sample was drawn.

To carry out this study, we had the approval of the authorities of the Faculty of Medical and Life Sciences of the Da Vinci University of Guatemala. The students who participated were informed about the objectives and importance of the research. Prior to taking the anthropometric measurements, each participant has filled out the written consent form. The confidentiality of the data obtained was fulfilled, which were used by the researchers and for research purposes.

In order to respond to the objective of the research, the following variables were operationalized: age, sex, weight, height, BMI, percentage of fat, body water, visceral fat, bone mass and Average Arm Circumference (CMB) to identify any protein depletion. Somatic.

To define the problem, an exhaustive search of the existing literature on the subject was carried out. To obtain the information, anthropometric measurements were made to the aforementioned students. Once the data was placed in the database, they were processed in the statistical program SPSS21 in Spanish. The results were presented in statistical tables.

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RESULTS

In Table 1 we can see that the majority of the 54 students evaluated are female. According to the percentage of body fat 52% healthy predominates; the same percentage exhibit with 20.4% each, the high fat and obese. Within the female sex, 57% predominated with a healthy classification, while within the males, the obese prevailed by 41.7%.

Table No 1 Distribution of students according to percentage of body fat and gender.

Classification according to the percentage of body fat		Gender		Total
		Female	Male	
HIGH FAT	Count	8	3	11
	% within gender	19.0%	25.0%	20.4%
LOW IN FAT	Count	4	0	4
	% within gender	9.5%	0.0%	7.4%
OBESE	Count	6	5	11
	% within gender	14.3%	41.7%	20.4%
HEALTHY	Count	24	4	28
	% within gender	57.1%	33.3%	51.9%
Total	Count	42	12	54
	% within gender	100.0%	100.0%	100.0%

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Note that Table 2 shows the percentage of body water according to sex. 81.5% predominate at an adequate level, followed by 11.1% at an inadequate level. Within both sexes an adequate classification predominated, being 83.3% in females and 75% in males.

Table No. 2. Distribution of students according to percentage of body water and gender

Body water percentage		Gender		Total
		Female	Male	
DOES NOT APPLY*	Count	4	0	4
	% within gender	9.5%	0.0%	7.4%
ADECUADO	Count	35	9	44
	% within gender	83.3%	75.0%	81.5%
INADECUADO	Count	3	3	6
	% within gender	7.1%	25.0%	11.1%
Total	Count	42	12	54
	% within gender	100.0%	100.0%	100.0%

*This bioimpedance measurement was not taken because they are minors.

Table No. 3 shows the percentage of visceral fat classification and gender. The healthy range prevailed with 88.9% where the female obtained 90.5% while in the males it was 83.3%.

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Table No. 3 Distribution of students according to their visceral fat classification and gender.

Clasificación según grasa visceral		Gender		Total
		Female	Male	
DOES NOT APPLY*	Count	4	0	4
	% within gender	9.5%	0.0%	7.4%
EXCESS	Count	0	2	2
	% within gender	0.0%	16.7%	3.7%
HEALTHY	Count	38	10	48
	% within gender	90.5%	83.3%	88.9%
Total	Count	42	12	54
	% within gender	100.0%	100.0%	100.0%

*This bioimpedance measurement was not taken because they are minors.

Table 4 shows that, of 54 students evaluated, in terms of classification according to bone mass, 68.5% predominate with inadequate bone mass, followed by 24.1% with adequate bone mass. In both genders, the inadequate classification of bone mass predominated; 66.7% within the females and 75% within the males.

Table. No. 4. Distribution of students according to classification of bone mass and gender.

Bone mass classification		Gender		Total
		Female	Male	
DOES NOT APPLY*	Count	4	0	4
	% within gender	9.5%	0.0%	7.4%

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APPROPRIATE	Count	10	3	13
	% within gender	23.8%	25.0%	24.1%
INADEQUATE	Count	28	9	37
	% within gender	66.7%	75.0%	68.5%
Total	Count	42	12	54
	% within gender	100.0%	100.0%	100.0%

*This bioimpedance measurement was not taken because they are minors.

Note that Table No. 5 shows the percentage of somatic protein depletion according to gender. In general and within both genders this depletion predominated as normal. Of the total, 79.6% obtained a higher percentage where the male predominates in a normal nutritional state, obtaining a percentage of 83.3%.

Table No 5. Distribution of students according to somatic protein depletion according to their gender.

Somatic protein depletion		**Gender**		**Total**
		Female	**Male**	
MILD DEPLETION	Count	7	1	8
	% within gender	16.7%	8.3%	14.8%
MODERATE DEPLETION	Count	2	1	3
	% within gender	4.8%	8.3%	5.6%
NORMAL	Count	33	10	43
	% within gender	78.6%	83.3%	79.6%
Total	Count	42	12	54
	% within gender	100.0%	100.0%	100.0%

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Note in table No. 6 that, of 54 students evaluated, in terms of nutritional status, 50% predominate with a normal nutritional status; the same percentage exhibits with 20.4% each of the groups recognized as grade one obesity and overweight. Within the female, 57% predominated with a normal nutritional status, while within the males, the following predominated with an equal percentage of 25% each: normal, grade one obesity and overweight.

Table. No. 6. Distribution of students according to nutritional status and gender.

Nutritional condition		Gender		Total
		Female	Male	
MILD MALNUTRITION	Count	1	1	2
	% within gender	2.4%	8.3%	3.7%
NORMAL	Count	24	3	27
	% within gender	57.1%	25.0%	50.0%
GI OBESITY	Count	8	3	11
	% within gender	19.0%	25.0%	20.4%
GII OBESITY	Count	1	2	3
	% within gender	2.4%	16.7%	5.6%
OVERWEIGHT	Count	8	3	11
	% within gender	19.0%	25.0%	20.4%
Total	Count	42	12	54
	% within gender	100.0%	100.0%	100.0%

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DISCUSSION

In a study carried out by Kaess BM, Pedley A, and Massaro JM, in 2015,[13] they found a similar behavior in both genders regarding the proportion of visceral fat, which shows that the two groups are prone to the accumulation of visceral fat, higher than 40% in both genders. However, the present study shows that, among women, more than half are classified as having a healthy nutritional status.

A study conducted by Medrano et al. in 2020,[14] found a similar behavior between men and women classified as having normal nutritional status. However, in the present study, it was found that, within the women, more than half were classified as normal in their nutritional status, but not among men.

In a study carried out by Suaza, De la Cruz and Aguirre in 2021,[15] they found a different behavior in terms of the percentage of body fat between men and women, since men had a better nutritional status than women. However, in the present work, it was found that within the women, more than half were classified as having a percentage of healthy fat, unlike the males, who were predominantly obese.

In a study carried out by Valderrama A, Uzuriaga F and Valderrama B in 2020,[16] they found a similar behavior between men and women, with a normal body mass index. However, in the present study, it was found that, within the women, more than half were classified as having a normal nutritional status, unlike men who were equally distributed in a normal nutritional status, grade I obesity and overweight.

The differences found between both genders could be related to the current influence exerted by social networks in the lives of women, who also aspire to be models, in addition to the profession they study. Maintaining a good nutritional state guarantees for many young people, especially females, not being the object of prejudice.

Escandón-Nagel et al. in their 2019 study on "Body image based on sex and nutritional status: Association with the construction of oneself and others"[17] found differences in relation to weight between men and women. The females were always below in this variable, in relation to the males. Trying to maintain the right weight is related to better self-esteem, fewer differences between how they see themselves and how others see it.

CONCLUSIONS

In this study it was found that the female students stand out for having a better nutritional status than the male students.

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FINANCING

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CONFLICTS OF INTEREST

No conflicts of interest are declared.

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LETTER OF AUTHORIZATION FOR PUBLICATION AND DISTRIBUTION

To the editorial committee of the Journal of Medical Sciences and Life

Article title: Nutritional status in first-year medical students at the Faculty of Medical and Life Sciences

Author's name:
Sandra Espinoza
Daniela Lucía Cifuentes Aguilar
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The authors of this work **agree** to comply with the following standards:

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2. All the authors reviewed the final version of the work and approved the publication in the Revista Ciencias Médicas y Vida.

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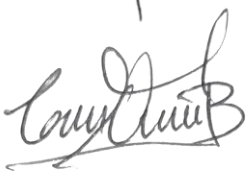

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