



# FACTORS ASSOCIATED WITH EXCESS BODY WEIGHT IN COLLEGE STUDENTS IN TIMES OF COVID-19

FACTORES ASOCIADOS AL EXCESO DE PESO CORPORAL EN ESTUDIANTES UNIVERSITARIOS EN TIEMPOS DE COVID-19

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## ABSTRACT

**Introduction:** Excess body weight affects the quality of life of millions of young people around the world. **Objective:** To determine the factors associated with the prevalence of overweight and obesity in university students during COVID-19, from October to December 2020. **Methods:** Analytical, cross-sectional research with non-experimental design. There was a population of 325 students of the professional career of medical technology and a sample of 169 students of both sexes. Body mass index and waist circumference diameter were used to calculate overweight and obesity. The associated factors were determined by means of a survey validated by expert judgment. **Results:** 49.1% of the students were overweight or obese, with females being the most affected. Of overweight or obese students, 59.0% were at high risk of abdominal obesity. According to eating habits, 97.6% of young people ate three or more meals per day, 81.9% consumed foods rich in carbohydrates and 54.2% consumed junk food 1 -2 times per week. In relation to sedentary lifestyle, 71.0% of students remained seated between 5 and 8 hours a day, 67.4% slept less than 7 hours a day and 57.8% did not perform any physical activity. **Conclusions:** The intake of food with high carbohydrate content, junk food, hours spent sleeping and sitting daily are the factors associated with the high prevalence of overweight and obesity among students during the COVID-19 period.

**Keywords:** Obesity; Overweight; Sedentary lifestyle; Eating Habits; COVID-19. (Source: MESH-NLM)

## RESUMEN

**Introducción:** El exceso de peso corporal afecta la calidad de vida de millones de jóvenes alrededor del mundo. **Objetivo:** determinar los factores asociados a la prevalencia del sobrepeso y obesidad en estudiantes universitarios en tiempos de COVID-19, durante octubre a diciembre del 2020. **Métodos:** Investigación de tipo analítica, transversal. Se contó con una población de 325 estudiantes de la carrera profesional de tecnología médica y una muestra de 169 estudiantes de ambos sexos. Para calcular el sobrepeso y obesidad se empleó el índice de masa corporal y diámetro de la circunferencia de la cintura. Los factores asociados se determinaron mediante una encuesta validada por juicio de expertos. **Resultados:** El 49,1% de estudiantes tenían sobrepeso u obesidad, siendo las mujeres las más afectadas. El 59,0% de estudiantes con sobrepeso u obesidad presentaron riesgo elevado de obesidad abdominal. Según los hábitos alimenticios, el 97,6% de jóvenes ingería tres o más comidas diarias, 81,9% consumía alimentos ricos en carbohidratos y 54,2% comida chatarra de 1 -2 veces por semana. En relación al sedentarismo, el 71,0% de estudiantes permanecía sentado entre 5 y 8 horas al día, 67,4% dormía menos de 7 horas diarias y 57,8% no realizaba ninguna actividad física. **Conclusiones:** La ingesta de alimentos con alto contenido en carbohidratos, comida chatarra, horas destinadas al sueño y que permanecen sentados diariamente son los factores asociados a la alta prevalencia de sobrepeso y obesidad de los estudiantes en los tiempos de la COVID-19.

**Palabras clave:** Obesidad; Sobrepeso; Sedentarismo; Hábitos Alimentarios; COVID-19. (Fuente: DeCS- BIREME)

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## INTRODUCTION

Overweight and obesity are caused by excessive fat accumulation in the human body<sup>(1,2)</sup>. They are of multifactorial origin, however, eating habits and physical inactivity are considered the most frequent causes<sup>(3,4)</sup>. Currently, excess body weight (overweight and obesity) presents a growing trend worldwide. Thus, in Latin America and the Caribbean it is estimated that at least one in four adults suffers from obesity<sup>(5)</sup>. The body mass index (BMI) is an indicator widely used in epidemiological studies to determine overweight and obesity<sup>(2)</sup>. Its use is recommended due to its adequate reproducibility, simplicity, and ability to reflect adiposity in a large part of the population<sup>(6)</sup>. Likewise, waist circumference serves as a complementary measure to establish abdominal obesity<sup>(7)</sup>.

Excess body weight increases the risk of developing hepatobiliary, pulmonary, cardiovascular, joint, various types of cancer, and diabetes mellitus, among others. Likewise, it can cause depression in people and difficulty in socializing with their environment<sup>(8)</sup>.

University students constitute a potentially vulnerable group due to the lifestyle they lead. A study carried out in India found an association between excess weight in university students and a lack of knowledge about healthy eating habits. In addition, reduced hours spent sleeping, living away from parents or guardians, tobacco use, social environment, and depression<sup>(6)</sup> had an influence. In addition to this, due to the health emergency caused by COVID-19, the universities opted for virtual education as an alternative to continuing teaching their educational offer. Students spend many hours a day in front of a computer, laptop, tablet or other electronic device to access their classes. This situation, added to little or no physical activity, the overload of academic activities and the stress caused by them, worsens their situation.

Therefore, the timely intervention and diagnosis of overweight and obesity will allow the implementation of adequate corrective measures. In this way, serious complications that affect young people's health and quality of life will be avoided. Given this, the objective

was to determine the factors associated with the prevalence of overweight and obesity in university students in times of COVID-19, during the months of October to December 2020.

## METHODS

### Design and study area

Observational, analytical, cross-sectional design study. The population consisted of 325 students from the professional school of medical technology of the Universidad Nacional de Jaén, department of Cajamarca, Peru.

### Population and sample

The sample consisted of 169 students of both sexes. Young people over 18 years of age, who were between the first and eighth cycles of their professional career, were included. Pregnant students and qualified athletes did not participate in the study. The evaluation was carried out during the period from October to December of the year 2020. To calculate the sample size, the statistical formula for known populations was used and the sampling was probabilistic of the simple random type.

### Variables, instruments and procedures

Overweight and obesity were calculated considering the body mass index (BMI) obtained by dividing the weight in kilograms (Kg) by the squared height ( $m^2$ ). The height and weight of the students were recorded only once, following the corresponding sanitary measurements. The BMI results were interpreted according to the criteria proposed by the World Health Organization<sup>(9)</sup>. Normal weight included values between 18,5- 24,5 kg/m<sup>2</sup>, overweight between 25,0- 29,9 kg/m<sup>2</sup> and obesity with a value equal to or greater than 30 kg/m<sup>2</sup>. Waist circumference was determined using a non-elastic measuring tape (length 150 cm). For this purpose, the midpoint between the last rib and the iliac crest was measured. In women, values less than 80 cm were included as low risk, between 80-88 cm as high risk, and values greater than 88 cm as very high risk of abdominal obesity. In men, values less than 94 cm were considered low risk, 94-102 cm as high risk, and values greater than 102 cm as very high risk of abdominal obesity<sup>(10)</sup>. Risk factors were collected using a structured survey technique. Variables such as sex, eating habits, alcohol, tobacco and drug consumption, sedentary



lifestyle, and physical activity were included. The applied instrument was a questionnaire qualitatively validated by experts. Its reliability was determined through a pilot test involving 30 young people who were not part of the study (Aiken's V: 0.87).

**Statistical analysis**

For the statistical analysis of the data, the Minitab® 19 program for Windows® version 8 was used. The evaluated variables were organized in tables, and descriptive statistics were used for their distribution. In addition, the chi-square test was performed to establish the relationship between risk factors and excess body weight in university students.

**Ethical aspects:**

The young people signed an informed consent to guarantee their voluntary participation in the study. The confidentiality of the information obtained was ensured, as established in the Declaration of Helsinki.

**RESULTS**

37.3% of students evaluated were overweight, and 11.8% obese. Women were the most affected, being 29.0% overweight and 5.9% obese. The significant relationship between the variables was established (Table 1).

ORIGINAL PAPER

**Table 1.** Prevalence of excess body weight according to the sex of university students.

Gender	Normal weight		Overweight		Obesity		Overweight + Obesity		Total		X <sup>2</sup>	p
	n	%	n	%	n	%	n	%	n	%		
Female	48	28.4	49	29.0	10	5.9	59	34.9	107	63.3		
Male	38	22.5	14	8.3	10	5.9	24	14.2	62	36.7	9,283	0.010*
Total	86	50.9	63	37.3	20	11.8	83	49.1	169	100.0		

X<sup>2</sup>: Chi squared      \* p<0,05      Significant

Table 2 shows that 59.0% and 13.3% of overweight and obese students had a high and very high risk of abdominal obesity, respectively. The chi-square test

demonstrated an association between the variables described.

**Table 2.** Relationship between waist circumference and excess body weight in university students.

Waist circumference	Overweight		Obesity		Total		P value	
	n	%	n	%	n	%	X <sup>2</sup>	p
Low risk	20	24.1	3	3.6	23	27.7		
High risk	40	48.2	9	10.8	49	59.0	16.639	<0.001*
very high risk	3	3.6	8	9.6	11	13.3		

X<sup>2</sup>: Chi squared      \* p<0,05      Significant

Most students who ate three or more meals daily were overweight (74.7%) and obese (22.9%). In addition, 66.3% and 15.7% of young people who frequently ate carbohydrates were overweight and obese, respectively. 54.2% of students who presented excess body weight consumed junk food between 1 and 2 times a week and frequently ingested soft drinks and

juices (49.4%). Likewise, 15.7% of those surveyed consumed alcoholic beverages one to two times a week, 14.4% smoked and none took drugs. An association was found between the consumption of junk food and carbohydrates with excess body weight (Table 3).



**Table 3.** Relationship between eating habits, alcohol, drug and tobacco consumption with excess body weight in university students.

Risk factors		Excess body weight						X <sup>2</sup>	p
		Overweight		Obesity		Total			
		n	%	n	%	n	%		
Number of daily meals	< 3 meals	1	1.2	1	1.2	2	2.4	0.752	0.426
	3 meals	62	74.7	19	22.9	81	97.6		
Carbohydrate consumption	Yes	55	66.3	13	15.7	68	81.9	5.099	0.024*
	No	8	9.6	7	8.4	15	18.1		
Beverage consumption	Water	31	37.3	11	13.3	42	50.6	0.204	0.652
	Soft drinks , juices	32	38.6	9	10.8	41	49.4		
Junk food consumption	1 -2 times per week	30	36.1	15	18.1	45	54.2	4.585	0.032*
	No consumption	33	39.8	5	6.0	38	45.8		
Consumption of alcoholic beverages	1-2 times per week	9	10.8	4	4.8	13	15.7	2.179	0.336
	1 time a month	20	24.1	3	3.6	23	27.7		
Smoking	does not ingest	34	41.0	13	15.7	47	56.6	0.006	0.937
	Yes	9	10.8	3	3.6	12	14.4		
Consumption of drugs	No	54	65.1	17	20.5	71	85.6		
	No	63	75.9	20	24.1	83	100.0		

X<sup>2</sup>: Chi squared

\* p<0,05

Significativo

Table 4 compiled information about the relationship between a sedentary lifestyle and excess body weight. 84.4% of overweight and obese respondents watched television less than three hours daily. In addition, 71.0% of students remained seated between 5 and 8 hours a day. The majority of students with excess body weight did not perform any physical activity (57.8%). 56.6% of

overweight university students and 10.8% who presented obesity stated that they slept less than 7 hours a day. 30.1% of the overweight students evaluated worked. A significant relationship was found between the daily hours that the students remain seated, the hours of sleep and excess body weight.

**Table 4.** Relationship between a sedentary lifestyle and excess body weight in university students.

Risk factors		Excess body weight						X <sup>2</sup>	p
		Overweight		Obesity		Total			
		n	%	n	%	n	%		
Daily hours in front of the television	< 3 hours	56	67.5	14	16.9	70	84.4	3.662	0.072
	≥ 3 hours	7	8.4	6	7.2	13	15.6		
Daily hours spent sitting	< 5 hours	7	8.4	7	8.4	14	16.8	6.975	0.031*
	5-8 hours	49	59.0	10	12.0	59	71.0		
	≥ 9 hours	7	8.4	3	3.6	10	12.0		



Hours of sleep	< 7 hours	47	56.6	9	10.8	56	67.4	6.061	0.014*
	≥ 7 hours	16	19.3	11	13.3	27	32.6		
Physical activity	1-2 days	21	25.3	4	4.8	25	30.1		
	≥ 3 days	8	9.6	2	2.4	10	12.0	1.662	0.436
	No	34	41.0	14	16.9	48	57.8		
Job	No	41	49.4	17	20.5	58	69.8		
	Yes	22	26.5	3	3.6	25	30.1	2.862	0.091

X<sup>2</sup>: Chi squared

\* p&lt;0,05

Significativo

## DISCUSSION

The study evaluated 169 students from a Peruvian university's medical technology professional school. 49.1% of young people were found to be overweight (37.3%) and obese (11.8%), coming mainly from urban areas (Table 1). Similar results were reported by Pengpid and Peltzer <sup>(8)</sup> when evaluating Indian university students. These authors found that 37.5% of young people had excess body weight (26.8% overweight and 10.7% obese). Likewise, studies carried out in the Peruvian population recorded high levels of overweight or obesity in young people <sup>(2,11)</sup>. It is estimated that the prevalence of overweight in urban areas is double that in rural areas. While obesity is up to seven times more frequent <sup>(12)</sup>.

Excess body weight was higher in women (overweight: 29.0% and obesity: 5.9%) (Table 1). These results coincide with Pajuelo et al two who reported a higher prevalence of obesity in women (23.4%), compared to men (15.7%). In addition, the study by Tarqui-Mamani et al. <sup>(13)</sup> showed that women had a greater tendency to a significant increase in weight over seven years of follow-up. This could be explained because women tend to accumulate a greater amount of body fat because their basal fat oxidation is lower than in men.

Other studies have shown that women have higher leptin concentrations. This hormone is responsible for regulating body weight, and its serum concentration is associated with the presence of estrogen. Its high production would explain why women frequently have a greater tendency to be overweight and obese than men <sup>(14)</sup>.

In Table 2, it was reported that 59.0% and 13.3% of students with excess weight presented a high and very high risk of abdominal obesity, respectively. In Colombia, the correlation between body mass index, waist circumference and cardiovascular risk in schoolchildren was evaluated. A waist circumference of 87.40 ± 6.59 cm was reported in men and 87.19 ± 7.09 in women, considered as a high risk of abdominal obesity <sup>(15)</sup>.

Waist circumference is a complementary measure to body mass index, determining an individual's risk of abdominal obesity. It has shown good correlation with the amount of intra-abdominal fat calculated through computed tomography. It is widely used because it is non-invasive and low cost. In addition, it is associated with an increased risk of cardiometabolic factors <sup>(16)</sup>.

Regarding the eating habits of young people with excess weight (Table 3). An association was demonstrated between consuming junk food and carbohydrates with overweight and obesity in young people. University students are a vulnerable group to present nutritional deficiencies. Many times they do not have enough time to have full meals as a result of university activities. Some youth replace meals with snacks. Likewise, they register a decrease in the consumption of fruits, vegetables and fish. While their consumption of fast food, snacks, soft drinks and alcohol is higher <sup>(17)</sup>. It should be noted that due to the COVID-19 pandemic, university education has been taking place in virtual environments. Young people must spend many hours in front of the computer to receive classes and develop their activities, increasing



anxiety levels about eating unhealthy food. In this regard, an investigation carried out in American students showed that weight gain is greater in university students compared to young people who do not attend university<sup>(18)</sup>.

The results obtained in this study indicated that there was no relationship between alcohol intake and overweight or obesity (Table 3). In addition, 100% and 85.6% of those surveyed stated that they did not use drugs or tobacco, respectively. Due to the measures established by the government to minimize the spread of COVID-19, social gatherings were restricted in Peru. This caused young people to reduce their alcohol intake due to existing prohibitions or fear of getting sick. Nevertheless, several studies affirm a direct relationship between alcohol intake and abdominal adiposity<sup>(19,20)</sup>. Alcohol is capable of inhibiting the effect of leptin and increasing an individual's appetite and food intake. Likewise, it has been shown that it inhibits the oxidation of fats, preventing them from being used as energy, which favors the accumulation of fat in the body<sup>(20)</sup>.

15.6% of respondents with excess body weight watched television programs for more than three hours a day. In addition, more than half remained seated between 5 and 8 hours a day and did not perform physical activity (Table 4). Other investigations on university students reported a greater tendency to be overweight in young people who did not perform physical activity<sup>(21,22)</sup>. In this regard, García<sup>(23)</sup> showed that little physical activity is often associated with "laziness", since young people feel comfortable with a sedentary lifestyle. Other conditioning factors of physical inactivity are lack of time and social support. Likewise, habits such as watching television and spending several hours sitting or lying down contribute to acquiring inactive lifestyles and favor increasing body weight<sup>(21)</sup>. Most of the students stated that they

did not have a job (69.8%). So they stay at home, which could also encourage their sedentary lifestyle.

67.4% of respondents slept less than 7 hours daily (Table 4). Similar results were registered in students belonging to six Chilean universities, where 76.3% slept less than the recommended number of hours<sup>(19)</sup>. Likewise, Duran-Agüero et al.<sup>(24)</sup> showed that sleeping fewer hours was associated with being overweight or obese (OR = 1.84; 95% CI 1.26-2.68) and also with daytime sleepiness. It should be noted that poor quality and quantity of sleep, as well as irregular bedtime, is a common problem among young people. This contributes to daytime sleepiness and increased food intake, which favors weight gain.

Among the study's limitations, it can be mentioned that the measurement of the variables was carried out only once and the type of cross-sectional study did not allow establishing a causal relationship. In addition, measures to establish the distribution of body fat and the evaluation of parameters such as glycemia, cholesterol and triglyceride levels, among others, were not included.

## CONCLUSIONS

In conclusion, the intake of foods with a high carbohydrate content and junk food, in addition to the hours spent sleeping and sitting, are the factors associated with the high prevalence of overweight and obesity in university students during COVID-19. Therefore, social policies directed towards the promotion of moderate physical exercise should be directed. Likewise, it is necessary to develop healthy eating programs that guide young people and the general population about the importance of a balanced diet. All of this will make it possible to face COVID-19 with better weapons, since obesity generates greater complications of the disease.

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