

Risk Factors for Diabetes Mellitus Type 2 in Medical Students

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Abbreviations:

BMI; Body Mass Index DM2; Type 2 diabetes mellitus
DM2; Diabetes mellitus tipo 2.

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Abstract

Aim: To determine the risk factors for Type 2 Diabetes Mellitus in fourth-year medical students at the University of Carabobo during the year 2019.

Methods: descriptive and transversal research. A questionnaire with the study variables was used as an instrument; A Likert-type scale was used to determine the diet of the sample, body mass index was calculated and the academic stress scale was used to assess stress. Finally, capillary blood glucose was estimated. Percentages and Chi² were used for categorical variables and measures of central tendency and dispersion for numerical variables, considering a p value < 0.05 to be significant.

Results: 111 students who agreed to participate were included. It was found that the median age was 21 years and 55% of the sample was made up of female individuals. The most important risk factors for diabetes mellitus were sedentary lifestyle (65.8%), heredity (52.3%), alcohol consumption (52.3%), high stress (50.5%), as well as poor eating habits (consumption of flour, fried foods and fast food).

Conclusions: The medical students examined showed a combination of sedentary lifestyle, heredity, alcohol consumption, high stress, poor eating habits, generally produced by academic work, conditioning a life exposed to chronic non-communicable diseases, such as type 2 Diabetes Mellitus.

Keywords: diabetes type 2, medical students, feeding behavior, stress, psychological

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Type 2 diabetes mellitus remains one of the most alarming public health problems globally. According to the World Health Organization, seven of the top 10 causes of death were noncommunicable diseases, and T2DM ranks sixth in low- to middle-income countries. In Venezuela, the delay in the publication of the Mortality Yearbook is a limitation to know the current reality¹ and is the fourth leading cause of death with an increase of 74.7% between 2005 and 2016², while the main causes of death among Latinos include heart disease, cancer, stroke and diabetes.³

One of the most relevant causes for the appearance of type 2 diabetes mellitus is obesity, and its origin is due to less exercise and spending more time sitting at the computer, watching television or studying, in addition to unhealthy eating habits, which could be common in medical students.⁴

Being a pathology of serious complications, it represents a high economic burden for the patient, their relatives and the State. That is why the decrease in its incidence is aimed at prevention. Due to its multifactorial nature, there are genetic components that induce the storage of fat tissue as a non-modifiable factor⁵ and also modifiable factors such as high consumption of hi-

gh-calorie fast foods, poor physical activity, short or altered sleep, smoking, stress and depression, all related to lifestyle, low socioeconomic status and microbiota, among others. involved in the appearance of DM2.⁶

On the other hand, stressful situations sustained over time lead the body to secrete hormones such as cortisol and leptin, which produce changes in metabolism, especially fats, and thus alter nutritional needs.⁹ Likewise, lack of sleep is another element that generates physical stress.¹⁰⁻¹²

Previous research has been published; such as the cross-sectional study, to analyze the relationship between risk perception and the risk of DM2, a survey was applied to 156 students, mainly female undergraduate students, through an online survey. They found that 32.7% of the study sample has a slightly elevated and 29.5% moderate/high risk of developing T2DM. They conclude that students who perceive a higher risk of developing T2DM correlate positively and significantly with the risk of T2DM.¹³

A cross-sectional-descriptive study was carried out in the country, where they evaluated the entire population of young aspirants to enter the Central University of Venezuela, during the years 2007-2014 (265 individuals in total). According to the results, the sample was characterized by lifestyle habits with Little physical activity (63.8%) and consumption of alcoholic beverages (80.8%) in both genders, a high consumption of carbonated beverages (>80%) and fast food (>90%). They conclude that the students of the Samuel Robinson Program (UCV), between 2007 and 2014, presented unhealthy eating and lifestyle habits.¹⁴

This research represents an opportunity to identify the risk factors for suffering from this pathology in the population of medical students, which handles scientific knowledge of the composition of a balanced diet, the importance of exercising regularly, the damage caused by smoking, alcohol, as well as the limitation in sleep hours as opposed to usual behavior. Thus, the need arose to investigate future health personnel, who are vulnerable to this pathology, which will be beneficial both for medical students and for the young adult population in general, and that is why the general objective is to determine the risk factors for type 2 diabetes mellitus in fourth-year medical students. To achieve this, specific objectives were established to describe age and sex, identify personal and to determine the risk factors for T2DM in the sample.

Methods

An observational, descriptive, and cross-sectional study with a quantitative approach¹⁵ was carried out during the months of March to May 2019.

The population consisted of 202 fourth-year students from the School of Medicine of the University of Carabobo, Carabobo campus, in the Department of Public Health.

Non-probability sampling was used for convenience. The sample consisted of 111 students (54.95% of the population) who met the inclusion criterion and agreed to participate.

The inclusion criteria were: to be a regular student of the year of study, over 18 years of age, to give informed consent, to belong to any age group, to be fasting and not suffering from pathologies at the time of application of the survey. Repeat students, students from other hospitals, minors and with underlying pathologies were excluded.

The survey was used as a data collection technique and, as an instrument, a structured questionnaire prepared by the authors with 17 questions, which allowed the identification of age, sex, family history (inheritance in type 2 diabetes mellitus, obesity and familial arterial hypertension) and personal history (macrosomia at birth, obesity in childhood, alcohol and tobacco use). In addition, the academic stress scale carried out by De Pablo et al. was used for the assessment of stress¹⁶, validated in Venezuelan university students by Feldman et al.¹⁷ This scale consists of 18 items based on a 10-point scale (0 = not at all stressful and 9 = very stressful) validated in Venezuelans by other authors (Cronbach's alpha ranges from 0.788 to 0.90). The types of food consumed were evaluated using a Likert-type scale. The instrument was approved through the judgment of three experts in the area (2 internists and 1 research methodologist), with experience in the subject and recognized as qualified experts. They evaluated an instrument an instrument used in the department, with structured questions about the variables to be measured, and the suggested changes were made.

Those who voluntarily agreed to participate were asked to fill out the informed consent. Once granted, the day and time for the data collection and the capillary blood glucose sample was mutually agreed. To obtain the BMI, the known formula of BMI (weight/height^2) was used. The data was obtained by weighing and measuring each participant using a scale with a height rod (Health&Meter).

The World Health Organization classification for BMI was used: low weight <18.50 kg/m² normal between 18.50-24.99kg/m² overweight between 25-29.99kg/m² and obesity greater than 30 kg/m². For the assessment of physical activity, among the study participants, those students who exercised less than three times a week, lasting less than an hour or who did not do it at all were classified as sedentary.

To evaluate alcohol consumption, the number of drinks consumed on a typical day was measured; considering moderate drinker to be someone who consumes 1-2 drinks, a drinker at risk to be someone who consumes 3-5 drinks and an excessive drinker if he drinks more than 5 drinks on a single occasion. Likewise, tobacco consumption, the student who responded to smoking at

present was classified as a “current smoker” distinguishing among them the “daily smoker”: at least one cigarette/day; “occasional smoker”: less than one cigarette/day, and “ex moker” who had quit smoking.¹⁸

The procedure for taking capillary glucosa samples was the standard; a Freestyle™ Brand glucometer, sterile lancets, specific test strips for the glucometer, gauze, soap and non-sterile gloves were used. Estimates between 70-100mg% were taken as normal value. Once the data were collected, they were captured in a database in Excel for Windows 13, from which they were processed in SPSS version 20, from which the results presented in frequency distribution and association tables emerged. A descriptive analysis was performed, calculating the absolute and relative frequencies for the categorical variables; and measures of central tendency (mean, median) and dispersion (range) in the quantitative variables, after a normality test, and the Student's t-test for the comparison of percentages, and Chi2 in the categorical variables, considering a p-value < 0.05 significant.

The protocol of this study was approved by the research committee of the department and the ethics committee of the Faculty of Health Sciences of the university under study, aligned with ethical standards that promote and ensure respect and protect health and rights (Declaration of Helsinki). To obtain the information, the students were approached, explaining the nature of the project, its objectives and benefits in favor of complete confidentiality and anonymity.

Results

Of the 111 participants, 54% were female, with no statistically significant differences between them ($p=0.11>0.05$). 91% were between 20 and 22 years old, with a median of 21 years, a minimum of 20 years, and a maximum of 25 years of age (Table 1).

Table 1. Age distribution according to gender. Fourth-year medical students. Department of Public Health, University of Carabobo, Valencia, Venezuela. 2019

Age (years)	GENDER		Total
	Famale	Male	
	f (%)	f (%)	
20	15 (13,5)	10 (9,1)	25
21	36 (32,4)	24 (21,6)	60
22	5 (4,5)	11 (9,9)	16
23	4 (3,6)	3 (2,7)	7
24	0 (.)	2 (1,8)	2
25	0 (-)	1 (0,9)	1
TOTAL	60 (54)	51 (46)	111

Source: Research data.

As for the history linked to the family environment, arterial hypertension was the pathology with the highest percentage, 63.1%. And in relation to personal history, alcohol consumption was the most frequent (Table 2).

Table 2. Distribution of family and personal history of type 2 diabetes mellitus. Fourth-year medical students. Department of Public Health, University of Carabobo, Valencia, Venezuela. 2019

N=111	
Family history	f (%) *
High blood pressure	70 (63,1)
Diabetes mellitus	54 (48,7)
Obesity	18 (16,2)
Endocrine disease	13 (11,7)
Cardiovascular pathology	8 (7,2)
Other	5 (4,5)
Personal history	f (%)*
Macrosomic at birth	
Yes	10 (9)
No	101 (91)
Childhood Obesity	
Yes	18 (16,2)
No	93 (83,8)
Smoking	
Yes	17 (15,3)
No	94 (84,7)
Alcohol consumption	
Yes	58 (52,3)
No	53 (47,7)

Source: research data.
(*) Percentages based on 111 students, where each student had one or more personal histories.

As for the stress scale, the median was 7.5 ± 0.9 points, a minimum of 1 point and a maximum of 10 points; 50.5% of participants had high stress, followed by 38.7% students with medium stress and 10.8% with low stress.

Clinical parameters: when performing capillary glycemia, a mean of 84.4 ± 14.3 mg%, minimum 59mg% and a maximum of 123 mg were found. 20.6% had values below 70 mg% (hypoglycemia), 73.8% registered normal values and 5.6% had hyperglycemia. In relation to the BMI of the students evaluated, 0.8% were underweight, 73.0% had normal weight, 14.4% were overweight and 11.1% were obese.

Among the risk factors identified, sedentary lifestyle reached the majority of cases. (Table 3).

On the other hand, the diet was mainly based on the intake of flour, fried foods and fast food in this sample. Review Figure 1.

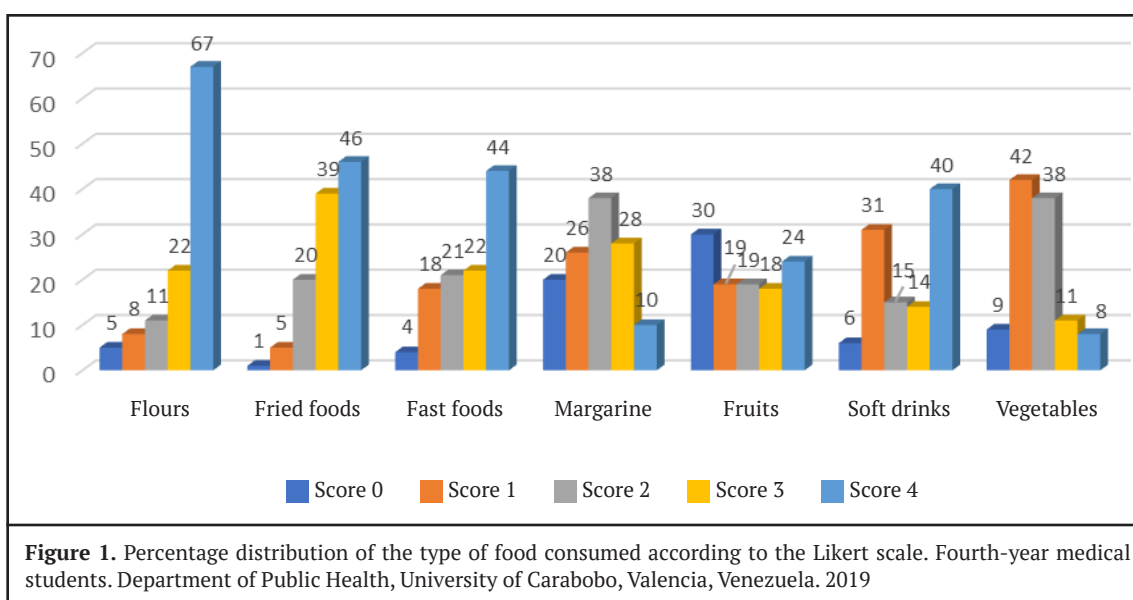


Table 3. Main risk factors in type 2 diabetes mellitus. Fourth-year medical students. Department of Public Health, University of Carabobo, Valencia, Venezuela. 2019

N= 111	
Factors	f (%)*
Sedentariness	73 (65,8)
Inheritance (DM)	58 (52,3)
Alcohol consumption	58 (52,3)
High stress	56 (50,5)
Obesity in childhood	18 (16,2)
Obesity or overweight	17 (15,3)
Smoking	17 (15,3)
Macrosomic at birth	10 (9,1)
Source: research data	
(*) Percentages based on 111 students, where each student had one or more risk factors.	

In general, 73%, 62% and 35% had one, two or 3 risk factors, respectively, and only an association was found between capillary glycemia and stress ($\chi^2=47.95$; $p=0.0444$).

Discussion

Type 2 diabetes mellitus is a public health problem that various studies associate its appearance with risk factors, poor eating habits and environmental conditions related to alterations in normal circadian rhythms. Our main findings revealed that the main risk factors found in the medical student population were sedentary lifestyle (65.7%), alcohol consumption (52.3%), family history of T2DM (52.3%), and high stress levels in 50.5% of students.

Age is a non-modifiable factor, and the studies reviewed published ages of 19 to 24 years, coinciding with this study¹⁹. In this sense, the implementation of activities aimed at preventing DM2 should consider the preparation of medical students as one of the population groups exposed, so that the perception of information is fully exploited by its recipients.

Regarding family history, type 2 diabetes mellitus, Khan et al.,²⁰ reported that 56% of their sample had a close relative who suffered from the disease, higher than 48.7% of our sample, so that the hereditary family history of diabetes in the mother and father is a risk factor for diabetes in at least one of the children in the family²¹, and should be known, managed and disseminated by the medical staff, and to the patients in their care, always in the interest of prevention.

In Venezuela, a sedentary lifestyle, alcohol consumption, smoking and being overweight multiply the risk of developing DM2. In this sense, overweight is reported by authors with percentages ranging from 9.1%, 16.7% to 44.6%,²²⁻²⁵ figures higher than those found in this study. It has also been reported by authors that being obese in childhood or adolescence is an important risk factor for developing DM2,^{20,24,25} in which case the majority of the sample did not manifest this antecedent, as is the case with macrosomia from birth, considered as another risk factor for acquiring DM2. where other authors reported that 15.9 % of their sample had gestational diabetes, 4.0 % had macrosomia and 9.9 % had large births for gestational age.²⁶ Regarding smoking and alcohol habits, as risk factors for the onset of type 2 diabetes mellitus, previous studies on similar topics support this assertion.²¹⁻²³ In the Latin American context, in Chile and Peru, the prevalence of smoking reaches 40.6% and 23.71%, respectively, a higher number

than that observed in our study; however, other authors reported 29.7% in terms of alcohol abuse, a figure lower than that of this study,²⁷ an aspect usually related to the high stress index. Another risk factor for DM2 considered in the research was sedentarism, which occurred in more than half of the sample studied, higher than the 23% reported in the adult population in the world and 32% in the region of the Americas.²⁸ In this regard, several authors report figures ranging from 39.5% to 78.0%,²⁰⁻²⁹⁻³⁰ alarming percentages for the youth population in accordance with the adoption of unhealthy lifestyles that increase the risk of suffering not only type 2 diabetes mellitus but also a large part of chronic non-communicable diseases. The findings show the need for the implementation of campaigns on healthy habits, focused on physical activity at the university.

In Venezuela and other Latin American countries, there are numerous reasons for the general population, including medical students, to maintain a high level of stress³¹⁻³² with figures below our study (38% and 44% respectively), where more than half of the participants reported having high stress, similar to the figure provided by Díaz-Sánchez³³ of 71.70% in relation to the prominent levels of stress. In addition, lack of sleep and academic load affect the appearance of sleep. Knowing how to effectively manage the emotions related to the disease, as well as motivation, learning about the condition, as well as trust in the health team and social support are fundamental pillars in the management of this pathology.

When capillary glycemic values were measured, hyperglycemia was at a higher level than in the study by Cruz-Ojeda,³⁴ where no hyperglycemia was reported in their sample, while Ibarra-Yagual et al.,³⁵ found that 24.9% of students had blood glucose values compatible with prediabetes in their study sample. This is worrying in the long term, in health professionals in training, such as medical students, and should translate into meaningful teaching to medical students about the importance of an idiosyncratic and specific approach to each patient, including their own way of life.

The consumption of fast food, flour and lack of physical activity have a direct influence on obesity, assessed by BMI. Overweight and obesity, representing a quarter of the sample, are indicators that must be taken into account. This risk factor is pointed out by previous studies with results similar to ours.¹⁴⁻²⁹⁻³⁶ Knowing that flour-based foods are usually cheaper than meats or complex carbohydrates, a part of the population is forced to consume them in unhealthy quantities.³⁷ In agreement with our study, Pinillos et al.³⁸ reported in their research that 24.7% of the students did not limit the use of sugars in meals and only 8.6% considered including the consumption of vegetables daily among

their habits; likewise, 54.8% consider only sometimes consuming between 2 to 4 servings of fruits in their daily diet. This hinders the care of diet as an essential element to maintain glucose, cholesterol, triglycerides, especially LDL levels, in adequate conditions.

The results reveal a high prevalence of modifiable risk factors among medical students, valuable data for designing preventive interventions. For the medical students of the University of Carabobo, it would be a valuable opportunity to get the information to the communities by carrying out community work, always guided by their teachers. And to do this, they must not only study the risk factors, but internalize them for their own benefit, since the harmful lifestyle added to a hereditary nature would cause alterations in the balance between glucose and insulin resistance, the result of which would be the progress of the increase in blood glucose.

It is necessary to take into account the multitude of factors that concur in the development of DM2 and, by virtue of this, to comprehensively address treatment and prevention, with different strategies that include, above all, changes in the way of life and in the care of the patient by health professionals. all this through the implementation of prevention programs through persistent information on this pathology.

Among the limitations was some refusal of the participants to enter the study, due to the sting for capillary glucose and because the financing had to be paid by the authors. Certain methodological limitations (cross-sectional design, possible biases) also did not allow generalizing population results. If statistically, potential confounding variables are controlled, the study offers a comprehensive view of medical students about the risk factors to which they are exposed.

In conclusion, the medical students studied sample showed a combination of heredity, sedentary lifestyle, alcohol consumption, high stress and poor eating habits, generally produced by unhealthy lifestyles, aspects that condition a life exposed to chronic non-communicable diseases such as DM2, which is contradictory in medical students, who handle the information, and yet do and yet do not practice it. Nevertheless; the results cannot be extrapolated to the general population.

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