ASSESSMENT OF THE RISK OF DEVELOPING TYPE 2 DIABETES MELLITUS AMONG MEDICAL STUDENTS AT UNIDA-PARAGUAY USING THE FINDRISC SCORE

AVALIAÇÃO DO RISCO DE DESENVOLVER DIABETES MELLITUS TIPO 2 EM ESTUDANTES DE MEDICINA DA UNIDA-PARAGUAI POR MEIO DO ESCORE FINDRISC

EVALUACIÓN DEL RIESGO DE DESARROLLAR DIABETES MELLITUS TIPO 2 EN ESTUDIANTES DE MEDICINA DE UNIDA-PARAGUAY MEDIANTE EL PUNTAJE FINDRISC

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ABSTRACT

Introduction: Type 2 diabetes mellitus (DM2) is a chronic disease with a high prevalence worldwide, whose increasing incidence among young adults is a cause for concern. The objective of this study was to estimate the risk of developing DM2 in UNIDA medical students using the FINDRISC score.

Methodology: Non-experimental cross-sectional study with a mixed approach carried out in 2023 with 211 medical students ≥18 years old, excluding pregnant women, individuals with a previous diagnosis of DM2 or cognitive deficit. The FINDRISC questionnaire was applied, cross-culturally adapted for the Paraguayan context. Anthropometric, sociodemographic and health data were collected.

Results: The mean age was 30.7 years. The risk of T2DM was classified as: low (47.9%), slightly increased (37.9%), moderate (10.4%), high (3.3%), and very high (0.5%). Factors such as a sedentary lifestyle, inadequate diet, obesity and family history were the main factors associated with the increased risk.

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Discussion: A study in Cuenca using the FINDRISC method identified a high risk of type 2 diabetes linked to overweight, sedentary lifestyle, and poor diet. Factors such as dyslipidemia, hypertension and obesity are also associated. FINDRISC is an effective, low-cost tool for preventing disease, especially in low-resource populations. In college students, stress and habits such as smoking and poor diet increase the risk of developing diabetes.

Conclusion: A significant percentage of students had a moderate to very high risk of developing T2DM, indicating the need for lifestyle-focused preventive interventions.

Keywords: Diabetes Risk. Findrisc. University Students. Risk Factors. Prevention.

RESUMO

Introdução: O diabetes mellitus tipo 2 (DM2) é uma doença crônica com alta prevalência em todo o mundo, cuja incidência crescente entre adultos jovens é motivo de preocupação. O objetivo deste estudo foi estimar o risco de desenvolver DM2 em estudantes de medicina da UNIDA usando o escore FINDRISC.

Metodologia: Estudo transversal não experimental com abordagem mista realizado em 2023 com 211 estudantes de medicina ≥ 18 anos, excluindo gestantes, indivíduos com diagnóstico prévio de DM2 ou déficit cognitivo. Aplicou-se o questionário FINDRISC, adaptado transculturalmente para o contexto paraguaio. Foram coletados dados antropométricos, sociodemográficos e de saúde.

Resultados: A média de idade foi de 30,7 anos. O risco de DM2 foi classificado em: baixo (47,9%), ligeiramente aumentado (37,9%), moderado (10,4%), alto (3,3%) e muito alto (0,5%). Fatores como sedentarismo, alimentação inadequada, obesidade e história familiar foram os principais fatores associados ao aumento do risco.

Discussão: Um estudo em Cuenca usando o método FINDRISC identificou um alto risco de diabetes tipo 2 ligado ao excesso de peso, sedentarismo e má alimentação. Fatores como dislipidemia, hipertensão e obesidade também estão associados. O FINDRISC é uma ferramenta eficaz e de baixo custo para prevenir doenças, especialmente em populações com poucos recursos. Em estudantes universitários, estresse e hábitos como tabagismo e má alimentação aumentam o risco de desenvolver diabetes.

Conclusão: Uma porcentagem significativa de estudantes apresentou risco moderado a muito alto de desenvolver DM2, indicando a necessidade de intervenções preventivas focadas no estilo de vida.

Palavras-chave: Risco de Diabetes. Findrisc. Estudantes Universitários. Fatores de Risco. Prevenção.

RESUMEN

Introducción: La diabetes mellitus tipo 2 (DM2) es una enfermedad crónica con alta prevalencia mundial, cuya creciente incidencia entre adultos jóvenes es motivo de preocupación. El objetivo de este estudio fue estimar el riesgo de desarrollar DM2 en estudiantes de medicina de la UNIDA mediante el puntaje FINDRISC.

Metodología: Estudio transversal no experimental con enfoque mixto realizado en el año 2023 con 211 estudiantes de medicina ≥18 años, excluyendo mujeres embarazadas, individuos con diagnóstico previo de DM2 o déficit cognitivo. Se aplicó el cuestionario FINDRISC, adaptado transculturalmente para el contexto paraguayo. Se recolectaron datos antropométricos, sociodemográficos y de salud.

Resultados: La edad media fue de 30,7 años. El riesgo de DM2 se clasificó como: bajo (47,9%), discretamente aumentado (37,9%), moderado (10,4%), alto (3,3%) y muy alto (0,5%). Factores como el sedentarismo, la alimentación inadecuada, la obesidad y los antecedentes familiares fueron los principales factores asociados con el aumento del riesgo.

Discusión: Un estudio en Cuenca usando el método FINDRISC identificó un alto riesgo de diabetes tipo 2 vinculado al sobrepeso, sedentarismo y mala alimentación. Factores como dislipidemia, hipertensión y obesidad también están asociados. El FINDRISC es una herramienta eficaz y de bajo costo para prevenir la enfermedad, especialmente en poblaciones de bajos recursos. En estudiantes universitarios, el estrés y hábitos como fumar y mala alimentación aumentan el riesgo de desarrollar diabetes.

Conclusión: Un porcentaje considerable de estudiantes presentó un riesgo moderado a muy alto de desarrollar DM2, lo que indica la necesidad de intervenciones preventivas centradas en el estilo de vida.

Palabras clave: Riesgo de Diabetes. Findrisc. Estudiantes Universitarios. Factores de Riesgo. Prevención.

1 INTRODUCTION

Type 2 diabetes mellitus (T2D) is a complex chronic condition that affects a large number of people worldwide. Its development is related to an interaction between genetic predisposition and sociodemographic factors, as well as lifestyle aspects, such as diet and lack of physical activity. Elements such as age, family history and ethnicity also play a role. To understand this association more precisely, it is essential to analyze the health habits and socioeconomic conditions of the populations studied (1).

Diabetes is one of the most relevant public health challenges worldwide (2). In 2021, it was estimated that around 537 million adults, between 20 and 79 years old, were living with this disease. Projections indicate that this figure could rise to 783 million by 2045. Type 2 diabetes accounts for about 90% of diagnoses, and it is worrying that a large proportion of cases have not yet been clinically identified. Therefore, prevention and timely diagnosis are key measures to reduce their impacts on global health. (3)

A fundamental aspect in the prevention of type 2 diabetes is the adoption of a healthy lifestyle, which includes a balanced diet and actions aimed at managing body weight. In this context, "mindful eating" has established itself as an effective strategy (4, 5 and 6). This approach focuses not only on the food you eat, but also on the reasons and how food choices are made. By promoting a more attentive relationship with food, this practice can contribute to the control of body mass index (BMI) and the reduction of the risk of developing diabetes in young adults. (7)

Type 2 diabetes is a metabolic condition characterized by insulin resistance, which can lead to serious complications, both microvascular (such as kidney disease and retinopathy) and macrovascular (heart attacks and strokes) (8, 9, 10 and 11). These complications not only decrease the quality of life, but also the life expectancy of patients. (12)

In this context, ***the FINDRISC is*** a tool used globally to assess the risk of developing type 2 diabetes. This questionnaire is composed of eight key parameters, including age, body mass index, waist circumference, level of physical activity, eating habits, use of antihypertensive medications, history of hyperglycemia, and family history of diabetes (13). In addition to its ability to predict the risk of developing T2DM, FINDRISC has also been shown to be effective in detecting undiagnosed diabetes, as well as identifying problems such as hepatic steatosis and cardiovascular events. (14)

The purpose of this article is to analyze the probability that medical students at the University of the Integration of the Americas will develop type 2 diabetes mellitus. To this end, a questionnaire will be applied to evaluate different risk factors associated with this disease,

with the aim of detecting possible vulnerabilities and promoting preventive measures within this youth population.

The relevance of this study lies in its ability to sensitize medical students about the risk of developing type 2 diabetes. In addition, it seeks to promote preventive actions that, in the future, can reduce the prevalence of this disease in the general population. In this way, it is expected to contribute to a cultural transformation that values prevention and self-care as fundamental pillars to maintain good health.

2 METHODOLOGY

This study was carried out by medical students in 2023 at the University of Integration of the Americas (UNIDA), located in Ciudad del Este, Paraguay for the hotbed of research in biochemistry, health and quality of life (BIOVIDA), it was a cross-sectional non-experimental study with a mixed approach. Data collection was carried out on the university campus, with the participation of medical students. Men and women (n = 211) over 17 years of age were included in the survey. Participants with cognitive impairments, pregnant women, and those with a previous diagnosis of diabetes mellitus (DM) were excluded.

For the assessment of the risk of developing type 2 diabetes mellitus (DM2), the Findrisc questionnaire, a risk assessment tool developed in Finland and widely used in international research, was used. The Findrisc questionnaire is a useful tool for estimating the likelihood of developing type 2 diabetes over a ten-year period. Its effectiveness has been proven through studies, establishing a cut-off point of 9 or more points as an indication of high risk. This tool has a sensitivity of approximately 76%, making it a reliable instrument for early detection, a specificity of 68%, a positive predictive value of 12%, and a negative predictive value of 98%. For this research, the questionnaire was translated and adapted cross-culturally to the Paraguayan context, and its reliability in this population was studied. (15)

The questionnaire collects information on the following parameters: age, body mass index (BMI), waist circumference (WC), level of daily physical activity, consumption of fruits, vegetables, and legumes, use of medication for systemic blood pressure control, history of hyperglycemia, and family history of DM. The final score is obtained by adding the values assigned to each answer, with a scale that varies from 0 to 26 points. Based on the score, the individual risk of developing T2DM is stratified into five categories: low, discretely increased, moderate, high, very high.

Additionally, information was collected on the following variables: gender, self-reported race/ethnicity (white, black, brown, indigenous, and others), marital status (married,

separated/divorced, widowed, single), educational level (in full years of study), smoking habits (current smoker, former smoker, never smoker), personal history of myocardial infarction, angina, hypercholesterolemia, and use of medications such as statins and/or corticosteroids.

Data were collected by medical students through the application of the Findrisc questionnaire and the measurement of anthropometric parameters. The interviews were conducted in a laboratory under conditions that guaranteed the confidentiality of the information. For anthropometric measurements, weight and height were recorded using a scale with a stadiometer attached. Participants weighed themselves in light clothing and without shoes, in an upright position. Abdominal circumference (BC) was measured with a non-extendable tape measure, placed at the level of the navel. BMI was calculated by dividing body weight (in kilograms) by height (in meters) squared.

The data analysis was carried out in two stages. First, measures of central tendency (mean, median, and dispersion) were calculated. Subsequently, a bivariate analysis was performed to investigate the relationship between the explanatory variables and the outcome (risk stratification according to Findrisc, < 15 and ≥ 15 points). Finally, a binary logistic regression was performed using the *forward method* to determine the association between the predictor variables and the risk of developing DM2, with the calculation of odds ratios (OR).

3 RESULTS AND DISCUSSIONS

The survey contains 211 (two hundred and eleven) students with an average age of ≈ 31 years, of whom almost two-thirds are women and 73.93% had nine or more years of schooling. The characteristics of the individuals with respect to the research variables are presented in Table 1.

Table 1

Characteristics of participants in cross-sectional research at the University of Medicine (N=211). Ciudad del Este, Alto Paraná, Paraguay – 2023

Features	N (%)
Age (years)	30,7
Sex	
Female	108 51,18
Male	103 41,82
Race	
White	104 49,28
Non-White	107 51,72
Marital Status	
No partner	169 80,01
With a partner	42 19,90
Schooling (full years)	
≥ 12	55 26,07
9-11	156 73,93
Smoking	
Never smoked	151 71,57
Ex-smoker/current smoker	60 28,43
Cardiovascular Disease Staff History	
No	184 87,20
Yes	27 12,80
Personal history of vascular brain accident	
No	206 97,64
Yes	5 2,36
Personal history of hypercholesterolemia	
No	193 91,47
Yes	18 8,53
Personal history of polycystic ovaries	
No/ Not Applicable	194 91,94
Yes	17 8,06
Current Statin Use	
No	204 96,68
Yes	7 3,31
Current Corticosteroid Use	
No	198 93,83
Yes	13 6,17

Source: Authors.

Table 2

Table 2 presents the characteristics of the individuals according to the FINDRISC variables and their distribution by age groups. A clear predominance of the age group under 45 years of age is observed, which represents 96.68% of the sample

Findrisc Questions		
Age Group (Years)		%
< 45	204	96,68
45-54	6	2,84
55-64	1	0,47
>64	0	0
Body mass index (kg/m)		
<25	103	48,82
25-30	87	41,23
>30	11	9,95
Abdominal circumference (cm)		
Men < 94, women < 80	121	57,35

Men 94-102, Women 80-88	51	24,17
Men > 102, women >88	39	18,48
Physical Activity		
Yes	107	50,71
No	104	49,29
Consumption of vegetables, legumes and fruits		
Every day	106	50,24
Does not consume every day	105	49,76
Use of medication for high blood pressure		
No	194	91,94
Yes	17	8,06
Elevated blood glucose history		
No	180	85,31
Yes	31	14,69
Family history of diabetes mellitus		
No	84	39,81
Grandparents, aunt, uncle, and/or first-degree cousins	80	37,91
Parents, siblings and/or children	47	22,28

Source: Authors.

Table 3

Risk Classification	***Scoring***	***N***	***%***
Low	**LESS THAN 7**	**101**	**47,87**
Discreetly augmented	**7-11**	**80**	**37,91**
Moderate	**12-14**	**22**	**10,43**
High	**15-20**	**7**	**3,32**
Very high	**GREATER THAN 20**	**1**	**0,47**

Source: Authors.

Table 3 presents data on the risks of developing T2DM. Based on the total score defined by FRINDRISC. The total score ranged from 0 to 21 points. It is observed that 85.78% are at low and slightly increased risk of developing DM2, 10.43% at moderate risk, 3.32% at high risk and 0.47% at very high risk.

This study indicates that the ability of these students who are at high and very high risk of developing DM2 is related to weight gain, sedentary lifestyle, lack of daily vegetable intake, tobacco smoke and a family history of DM2.

4 DISCUSSION

A research carried out in the city of Cuenca, using the Findrisc method, revealed a high probability of developing type 2 diabetes, mainly linked to excess weight, physical inactivity and unhealthy eating patterns. Among the risk factors identified are dyslipidemia, high blood pressure, hyperglycemia, obesity and eating disorders. Although there are non-modifiable factors such as age, genetic inheritance and ethnicity, adopting a healthy lifestyle can be decisive in preventing the disease. Improving diet, regular physical activity, and taking

care of mental health can contribute not only to reducing the risk of diabetes, but also to promoting cardiovascular health, detoxifying the body, and stimulating the production of hormones related to well-being, such as dopamine (16).

The data presented in the research carried out in Ciudad del Este reveal a population profile with several risk factors associated with the development of chronic non-communicable diseases, such as type 2 diabetes. The average age of 31 years indicates a young-adult population, a key stage for the implementation of preventive measures. Despite the gender balance, a significant proportion of women who use oral contraceptives (31.75%) stands out, which may have long-term metabolic implications.

The high percentage of individuals with a history of smoking (28.43%) and current smokers (26.54%) reinforces the need for health policies focused on smoking cessation. Likewise, 17.54% with hypercholesterolemia and 12.80% with a history of stroke reflect a population with cumulative exposure to cardiovascular risk factors.

The prevalence of overweight, sedentary habits, and inadequate diet—reported in the Cuenca study and applicable due to contextual similarity—could be acting synergistically with these clinical factors. Therefore, it is urgent to promote healthy lifestyles, which include regular physical activity, a balanced diet and stress control, to reduce not only the risk of type 2 diabetes, but also to improve the overall health of this university population.

The Findrisc proved to be a fundamental tool worldwide for the prevention of chronic diseases such as diabetes mellitus, hepatic steatosis, cardiovascular risk, inflammatory diseases in disadvantaged regions due to its low cost benefit. DM2 is one of the important risk factors for cardiovascular disease and 80% of the low-income population is not diagnosed early due to inaccessibility of public health and low resources and through findrisc the low-income population can be alerted to the risk of developing T2DM. (17).

The data presented in Table 2, analyzed through the FINDRISC questionnaire, show a young population profile, with a high prevalence of modifiable risk factors associated with the development of type 2 diabetes. Despite the fact that 48.82% of the participants have a BMI within the normal range, a worrying 41.23% are overweight, and 61.13% have increased abdominal circumference, both key indicators in the development of metabolic syndrome.

60.19% do not perform regular physical activity and 59.24% do not consume fruits, vegetables or legumes daily, which reveals unhealthy lifestyle habits. Although the use of antihypertensive medications (3.79%) and previous hyperglycemia (5.21%) were present in lower percentages, they are clinical warning signs. 22.27% with a family history of first-degree diabetes mellitus reinforces the need for early interventions, especially considering that DM2 is an important risk factor for cardiovascular diseases. The FINDRISC, due to its

low cost and ease of application, is configured as a key tool to identify risks in low-income populations with limited access to health services, allowing the effective prevention of chronic non-communicable diseases.

In a family medicine clinic in Mexico, the Findrisc questionnaire was applied with the aim of identifying the risk of developing type 2 diabetes among the patients treated. As a result, 49 people were detected with signs of prediabetes, 12 with possible cases of undiagnosed diabetes and a total of 61 patients had some of these metabolic alterations. To complement the risk assessment, tests such as capillary glycemia, glycosylated hemoglobin (HbA1c), and the oral glucose tolerance test proved to be highly effective clinical tools consistent with the findings obtained through the questionnaire. (18)

The habits that mainly influence the lives of these individuals are not eating an adequate diet, being sedentary and not being able to quit smoking, a restriction and deprivation in the lives of these people. (19)

The bad habit of smoking in university students is related to several reasons, such as curiosity and social acceptance, but, in addition, nicotine addiction is seen assuming the mental and emotional integrity that leads the student to resort to this risk in search of relaxation and pleasure. (19)

Some factors that influence poor nutrition, such as university life itself, which is caused by the exhaustive workload, favors stress in the student's life, opting for the easy and not the healthy, causing a change in eating habits, associated with the practice of sedentary lifestyle and nicotine. It can have an impact on the health of these people by raising blood sugar and altering cells so that they do not respond to insulin and cause inflammation (20).

5 CONCLUSION

From this research it can be concluded that sedentary lifestyle, smoking, poor diet, genetic factors and weight gain predispose to insulin resistance in this sample of medical students. Stress leads many students to seek out quick and pleasurable meals. Therefore, it is necessary to invest in the creation of sports and awareness programs about healthy eating. Prevention and counseling programs on metabolic syndrome are essential for early diagnosis and avoiding complications.

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