

Cardiovascular Risk Factors and Diabetes in Medical Students: Observational Study, Experience in Colombia

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Abstract

Background: Cardiovascular Disease is a leading cause of preventable death. Cardiovascular risk factors' identification is the cornerstone for effective and early interventions decreasing the frequency of acute health-threatening events. Since adolescence and youth are very vulnerable stages to develop risky habits, we decided to run this study in the Multidisciplinary University Camp for Research and Service. **Methods:** A descriptive cross-sectional study was performed in the Multidisciplinary University Camp for Research and Service in which 450 medical students from Colombia were assessed. After a probabilistic random simple sampling (n=50), we applied the World Health Organization test and Finnish Risk Score to calculate Cardiovascular and Diabetes Mellitus risk, respectively. We characterized the population by sociodemographic variables and anthropometric measurements. **Results:** The study shows that from 18 participating universities (n=50), the mean age of the participants was 21.14 years (SD 7.3) of whom 40% were male and 60% were female. Overall, 92% have a low risk of cardiovascular disease, 6% are at moderate risk and 2% are at high risk. 92% have low risk of diabetes mellitus and 8% are at moderate risk of having diabetes mellitus in the long term. **Conclusion:** The early identification of and intervention on risk factors could decrease significantly the onset of acute health-threatening cardiovascular pathologies. As medical students, adolescents and young adults are at risk of developing unhealthy habits which increase the incidence of cardiovascular disorders. The use of anthropometric measures and validated risk score scales is an appropriate way to get evidence for starting early interventions.

Key Words: Risk Factor, Cardiovascular Diseases, Diabetes Mellitus, Medical Students (Source: MeSH-NLM).

Introduction

Worldwide, Cardiovascular Diseases (CVD) have been considered public health problems since they are the first cause of death and disability.¹⁻² This group of diseases includes disorders of the heart and blood vessels, including coronary heart disease, stroke, peripheral arteriopathy, rheumatic cardiopathy, infectious cardiac disease, congenital cardiopathy, deep vein thrombosis, pulmonary thromboembolism etc.³⁻⁴

Epidemiological reports indicate an estimate of 17.5 million CVD-related deaths in 2012, accounting for 31% of all deaths registered in the world. Of these, 7.4 million were due to coronary heart disease and 6.7 million to stroke. More than three-quarters of CVD deaths were in low and middle-income countries.³ In Colombia, cardiac ischemic disease in the last decade has been the leading cause of death in people over 55 years of age, above cancer and assaults, according to the National Administrative Statistics Department (DANE).⁵ For the 2000-2010 period, cardiovascular mortality in men was 136/100.000 people, while in women it was 125/100.000 people.⁶

The etiology of CVD is multiple, complex, with an early development, and their evolution is related to the presence of Cardiovascular Risk Factors (CVRF).⁷ A risk factor is any attribute which alters the frequency of occurrence of an event. Currently, CVD risk factors are classified in modifiable and non-modifiable. The first ones are those that can be changed, either by improving lifestyle or using pharmacological interventions. Meanwhile, non-modifiable are those which are not susceptible to change, for example age, gender, and inheritance.³ The World Health Organization (WHO) considers smoking, sedentary lifestyle, diet, diabetes mellitus, dyslipidemia, arterial hypertension (HT) as main and modifiable risk factors.^{3,7} There is evidence which

supports that smoking cessation, reduced dietary salt intake, fruits and vegetables consumption, regular physical activity and avoidance of harmful alcohol consumption reduces the risk of CVD.³

Besides, there are also some underlying determinants of chronic diseases that are "the causes of the causes" which reflect on the forces which determine social, economic and cultural changes: globalization, urbanization and aging of population. Other determinants to develop stroke are poverty, stress and hereditary factors.⁸⁻¹⁰

Early cardiovascular events refer to any events which occur before or during the fifth decade of life in men and the sixth decade of life in women. However, initial atherosclerotic lesions leading to clinical events commence much earlier. These can be evidenced during the second decade of life when Cardiovascular Risk Factors can be detected, especially metabolic ones like dyslipidemia or obesity.¹¹⁻¹²

Adolescents and young adults are very vulnerable to develop dangerous habits, such as alcoholism, smoking, drug addiction and risky sexual practices. One should be concerned about the health of this population, since students are a young population not enough studied. In general, some diseases generally develop later in their lives, not during young adulthood.¹³⁻¹⁴ The Multidisciplinary University Camp for Research and Service (CUMIS) is a national event coordinated by the Association of Scientific Societies of Medical Students of Colombia (ASCEMCO), where medical students from each Colombian faculty can meet with the goal to provide healthcare to their selected community.¹⁵

The population of medical students presents certain characteristics that are relevant and explain why this population should be included in studies. An investigation developed in health sciences students of the

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University of the Andes pointed out that the general prevalence of stress was 36.3%, medical student having higher levels of stress compared to other careers.¹⁶ At the Military University of Colombia, a study was conducted on medical students to identify the prevalence of depressive symptoms: the global prevalence was 53.2%, and 26.1% of students had mild depressive symptoms, whereas 5.4% had a severe symptomatology.¹⁷ Both stress and depression, among other psychosocial factors, are considered precipitating factors and are said to decrease the quality of life and survival in relation to noncommunicable chronic diseases.¹⁸

In studies at universities in Latin American countries near Colombia, it has been described that this population has special characteristics that should be studied more thoroughly. At the University of Valparaíso of Chile, it was found that the most prevalent risk factor for the development of chronic noncommunicable diseases (prevalence: 88%) is physical inactivity; overweight and obesity had a prevalence of 31.8%, being higher in men than in women, and smoking with a prevalence of 23.6%, thus concluding that the prevalence of the risk factors studied is high.¹⁹ In the University of Carabobo of Venezuela, the most frequent risk factor was sedentary lifestyle (72.49%), followed by alcohol consumption habits (68.3%) and smoking habits (34.16%); 37.5% had high consumption of oils and fats, 58.3% of starches and sugars, and, in addition, 33.34% of participants were overweight or obese, 3.33% presented hypertension and metabolic syndrome. The predominant family history was for hypertension (60%) and obesity (28.2%), and thus a similar conclusion to the previous research was drawn.¹⁸

The final goal of this work was to identify the presence of cardiovascular risk factors in Medicine Students who attended the CUMIS event, to know and identify the national reality in this population group, and then develop long term strategies which would allow us to decrease the incidence of cardiovascular diseases and early deaths.

Methods

We conducted a cross-sectional descriptive study which included the total population of medical students who attended the CUMIS (n=450). We obtained a probabilistic random simple sampling of students (n=50) from different medicine faculties from Colombia, who accepted to take 2 instruments of data recollection, the first one developed by WHO and the International Society of Hypertension (WHO/ISH) to calculate cardiovascular risk, the second one the Finnish Risk Score to calculate the risk of Diabetes Mellitus.¹⁹

Sociodemographic variables, such as age, gender and university, and clinical variables such as weight, height, body mass index (BMI), systolic and diastolic blood pressure, pathological background as diabetes mellitus or tobacco consumption, were also collected.

We recollected the data during activity breaks in CUMIS. We applied the instrument to people who met the inclusion criteria, which were: to be a medical student enrolled in a Colombian faculty, to be a CUMIS assistant, and to accept to participate in the study. Exclusion criteria were: not being a medicine student and not accepting to participate in the study. Study variables were deposited in a spreadsheet of Microsoft Excel 2016® and analyzed in the statistical program Epi Info 7®.

This study is considered a "risk-free research", according to Resolution No. 008430 of 1993 of the Ministry of Health of Colombia, which establishes the scientific, technical and administrative standards for health research. The study was approved by the organizers of the CUMIS and the Permanent Committee of Evaluation and Scientific Development of the ASCEMCO.

Results

The study included 50 medical students from different Colombian universities who attended the Multidisciplinary University Camp for

Research and Service (CUMIS). The mean age of the participants was 21.14 (Standard Deviation [SD]: 7.3 years, 95% CI: 19.1-23.1 years). The gender distribution was 40% males (n = 20) and 60% females (n = 30). The distribution by university is shown in **Table 1**.

Table 1. Distribution of the Population Studied by Each Participating University.

University	n	%
University of Tolima	4	8
Alexander Von Humboldt University	9	18
University of Caldas	5	10
University of Valle	2	4
Cooperativa de Colombia University - Villavicencio	1	2
Cooperativa de Colombia University - Medellín	1	2
Central del Valle University	5	10
University of Quindío	1	2
Fundación Universitaria Autónoma de las Americas	5	10
Industrial de Santander University	1	2
University of Sinu	1	2
Militar Nueva Granada University	4	8
University of Antioquia	1	2
Antonio Nariño University	1	2
ICESI University	6	12
Pontificia Universidad Javeriana	1	2
Tecnológica de Pereira University	1	2
University of Manizales	1	2

All the students were weighted, finding an average weight of 64.9 kg (SD: 11.8 kg) and height was measured, with an average of 1.69 m (SD: 0.08 m). The Body Mass Index (BMI) was calculated: 44 students (88%) had a BMI between 18 and 25 kg/m², 5 (10%) of them had a BMI greater than 25 kg/m² and only 1 (2%) student had a BMI of less than 18 kg/m².

Of the evaluated population, none had a history of diabetes and only 10% (n = 5) reported being smokers. Based on age, gender, history of diabetes, cigarette consumption and systolic and diastolic blood pressure, we calculated cardiovascular risk as shown in **Table 2**.

Table 2. Classification of Population in the Different Risk Levels Proposed by WHO/ISH Risk Prediction Charts and their Recommendation by Percentage and Frequency.

Risk levels	n (%)	Recommendation
Low risk (risk less than 10%)	46 (92%)	-
Moderate risk (risk between 10% and 20%)	3 (6%)	Monitor the risk profile every year and guide to assume habits and healthy lifestyles
High risk (risk between 20% and 30%)	1 (2%)	Monitor the risk profile every 6 months and guide to assume habits and healthy lifestyles
Very high risk (risk between 30% and 40%)	0	Monitor the risk profile every 3 months and guide to assume habits and healthy lifestyles
Extremely high risk (risk >= 40%)	0	Monitor the risk profile every 3 months and guide to assume habits and healthy lifestyles

Legend: The calculated risk of the participant indicates the 10-year risk of combined myocardial infarction and stroke (fatal and non-fatal).

Based on 8 questions that included age, waist circumference measured below the rib in cm, BMI, daily physical activity of at least 30 minutes, frequency of consumption of vegetables, consumption of medication for arterial hypertension, findings of high glucose levels on routine

visits to the doctor and if they have a history of diabetes in their family, the risk for diabetes was calculated as shown in **Table 3**.

Table 3. Classification of Population in the Different Risk Levels Proposed by Finnish Diabetes Risk Score and Their Recommendation by Percentage and Frequency.

Diabetes risk	n (%)	Recommendations
High risk (>12 points)	0	Suggested to perform an oral glucose tolerance test and change lifestyle habits to improve your health
Medium risk (10-12 points)	4 (8%)	Suggested to increase physical activity, to improve their eating habits and pay attention to their weight, to prevent the development of diabetes, changes in lifestyle can completely prevent diabetes or at least delay its onset until very advanced ages
Low risk (<10 points)	46 (92%)	Suggested that you control your weight regularly, consume fruits and vegetables daily and practice at least 30 minutes of moderate intensity physical activity per day to maintain or improve your health

Legend: High Risk (> 12 points) means a high risk of developing prediabetes or diabetes in the next 10 years. Moderate risk (10-12 points), moderate risk of developing prediabetes or diabetes in the next 10 years. Low Risk (<10 points), low risk of developing prediabetes or diabetes in the next 10 years.

Discussion

CVD are entities which are the results of different risk factors which begin at the time of birth and end at the moment when the acute pathology is triggered.²⁰ This is why they are the first cause of death in Colombia.²¹ The evaluation of these factors from an early age and their correction is the way to reduce these pathologies.²²⁻²⁴

A study conducted in young university students of Santa Fe locality in Bogota, Colombia reported as main risk factors for cardiovascular disease alcohol consumption, smoking and physical inactivity.²⁵ Those risk factors should be the cornerstone for an effective and early intervention and improvement the quality of life.

According to the results of this study, five people were active smokers with a prevalence of 10%. This prevalence is lower compared to some studies conducted in Colombia between 2010 and 2015 which report a prevalence of 15% in University of Pamplona, 22% in a private university in Manizales city, University of Cartagena 24%.²⁶⁻²⁸ Also, the National Study of Psychoactive Use 2013 reported a national prevalence of smoking of 16% in people between 18 and 32 years old.²⁹ Some studies in Latin America and North America report a prevalence of smoking in university students of 43% in Peru, 33% Chile, USA 35%.³⁰⁻³²

Obesity and overweight is an important risk factor to develop CVD. The measure of BMI is an appropriate, cheap and easy tool to make a

diagnosis of weight alterations. This study revealed that 5 people (10%) have a BMI >25. This result is lower compared to some studies conducted in university students which report a BMI > 25 prevalence of 26.47% in a private university in Bucaramanga, University of Pamplona 17.3%, and a prevalence in other countries as Chile of 30%.^{31,33} The relationship between gender, smoking, and BMI >25 was not similar compared to the national epidemiology, or some other studies in Colombia.²⁶⁻²⁸

We did not find studies evaluating those risk factors specifically in medical students in Colombia. However, according to a study carried out in Chile in 2014 in which medical, educational and engineering students were evaluated, BMI > 25 prevalence in third year medical students is 36.2%, physical inactivity 60.3%, smoking 15.5% and alcohol consumption 70.7%.³¹ BMI and smoking prevalence in our study is lower compared to this study. Medical students and physicians need to know about this very high prevalence of modifiable risk factors and make an early intervention to adopt healthy lifestyles and reduce the incidence of important diseases.

In our study, students coming from 18 universities from all over the country were enrolled. We could observe that although the great majority of the population (92%) has a low risk of cardiovascular disease and diabetes mellitus (92%), 6% are at moderate risk and 2% are at high risk, and 8% are at moderate risk of having diabetes mellitus in the long term. The relationship between gender was not maintained in relation to national epidemiology, since it was the female sex that had the highest BMI (31.7 kg/m²), as well as risk factors such as smoking (3 out of 5 students who were smokers).⁶ These two pathologies go hand in hand and so does their prevention.³⁴⁻³⁵

It is important to clarify that although a university population of medical students from all over Colombia has been taken, we still need to develop more research that will allow us to include the outcomes of unaddressed risk factors and how they influence the development of these pathologies. We must also relate to the different university careers that are taught in a university and evaluate the relationship between these and the development of a chronic disease. Additionally, there could be a selection bias since the population in our study is not older than 25 years old; however, the instrument to calculate the cardiovascular risk has a minimum age limit of 40 years and the population of study are university students, thus this bias was not considered relevant by the researchers.

Cardiovascular diseases and diabetes mellitus are increasing, and this is where future health professionals must intervene to improve the quality of life of their patients. As we observed in our study, cardiovascular risk factors and diabetes mellitus have characteristics that can be modifiable, and it is worrying that every day they appear in a younger population, an argument that makes us aware that the only way to preserve a healthy life is with prevention and development of public health strategies that allow us to generate a definitive impact on populations to reduce the incidence and early deaths caused by these pathologies.

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Conception and design the work/idea: DMBE. Collect data / obtaining results, Analysis and interpretation of data, Write the manuscript, Critical revision of the manuscript, Approval of the final version, Contribution of patients or study material, Obtaining financing, Statistical advice, Administrative or technical advice: DMBE, KVLO, JEYR.

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