CorSalud 2026;18(1):e1260

Cuban Society of Cardiology

Original Article

Characterization of ischemic heart disease at the XX Anniversary University Teaching Polyclinic, Santa Clara, Villa Clara

Caracterización de la cardiopatía isquémica en el Policlínico Docente Universitario XX Aniversario, Santa Clara, Villa Clara

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ARTICLE INFORMATION

Recibido: 02/12/2025
Aceptado: 24/02/2026

Competing interests:
The authors declare no competing interests.

Article category:
Clinical Cardiology and Risk Factors

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Abstract

Introduction: Ischemic heart disease is the leading cause of death in Cuba and the world, and management of ist risk factors has proven to be effective. Objective: To identify cardiovascular risk factors for ischeamic heart disease in adult patients at the XX Anniversary University Teaching Polyclinic in Santa Clara. Methods: An epidemiological, analytical, and case-control study was carried out between May 2019 and February 2020 at the XX Anniversary University Teaching Polyclinic in the municipality of Santa Clara, Villa Clara. 840 subjects over 50 years of age were selected using probability and two-stage sampling. A multivariate logistic regression analysis was performed to determine the risk factors associated with ischemic heart disease. Results: The most significant risk factors were: positive family history of ischemic heart disease (38.2%), high consumption of animal fats (33.9%), high wais/hip ratio and abdominal circumference (33.8%). Conclusions: In the studied population, the cardiovascular risk factors that showed an independent and significant association with ischemic heart disease were high consumption of animal fats, hypercholesterolemia, diabetes mellitus, low consumption of fish, smoking, and family history of the disease.

Keywords: Ishemic heart disease; Risk factors; Myocardial infarction; Prevention; Treatment.

Resumen

Introducción: La cardiopatía isquémica es la principal causa de muerte en Cuba y el mundo, y el manejo de sus factores de riesgo ha demostrado ser efectivo. Objetivo: Identificar los factores de riesgo cardiovascular para la cardiopatía isquémica en pacientes adultos del Policlínico Docente-Universitario XX Aniversario de Santa Clara. Método: Se realizó un estudio epidemiológico, analítico y de casos-controles, entre mayo del 2019 hasta febrero del 2020, en el Policlínico Docente-Universitario XX Aniversario del municipio de Santa Clara, Villa Clara. Se seleccionaron 840 sujetos mayores de 50 años mediante muestreo probabilístico y bietápico. Se ejecutó un análisis multivariado de regresión logística para determinar los factores de riesgo asociados a la cardiopatía isquémica. Resultados: Los factores de riesgo más significativos fueron: antecedentes patológicos familiares positivos para la cardiopatía isquémica (38,21 %), consumo de grasas de origen animal elevado (33,93 %), índice de cintura/cadera y circunferencia abdominal elevados (33,81 %).Conclusiones: En la población estudiada, los factores de riesgo cardiovascular que mostraron una asociación independiente y significativa con la cardiopatía isquémica fueron el consumo elevado de grasas animales, la hipercolesterolemia, la diabetes mellitus, el bajo consumo de pescado, el tabaquismo y los antecedentes patológicos familiares.

Palabras Clave: *Cardiopatía isquémica; Factores de riesgo; Infarto del miocardio; Prevención; Tratamiento.*

Introduction

Noncommunicable chronic diseases are the leading cause of mortality worldwide. In 2019, 7 of the 10 leading causes of death globally belonged to this group, among which cardiovascular disease (CVD) represents the greatest burden of mortality and disability.[1]

Ischemic heart disease (IHD) is a syndrome caused by an imbalance between the supply of oxygen and nutrients to the myocardium via the coronary arteries and the metabolic demands required to maintain adequate cardiac function.

Acute coronary syndromes (ACS), including ST-segment elevation (STEMI) and non-ST-segment elevation (NSTEMI)2, generally occur from the fifth decade of life onward and are associated with various risk factors that vary across populations.

Major risk factors include high blood pressure, diabetes mellitus, hypercholesterolemia, smoking, age, and early family history of IHD. Secondary risk factors include physical and/or emotional stress, sedentary lifestyle, obesity, metabolic syndrome, and sleep apnea, among others.[3]

For decades, the scientific community has established that modifications of risk factors are key in the management of IHD. Several Cuban authors have made notable contributions, as in the cases of Reyes et al.[4], and Montano and Prieto[5]. The former provides one of the most comprehensive conceptualizations by stating that: "Risk is defined as the probability of experiencing harm, developing a disease, or dying from a specific condition or adverse event in the presence of certain circumstances that affect an individual, a group of individuals, a community, or the environment. It expresses the likelihood that harm may or may not occur [...]. Thus, a risk factor can be defined as any attribute or characteristic that confers upon the individual a variable degree of susceptibility to develop a disease or health disorder."[5]

When applied to the probability of developing a cardiovascular disease, the term cardiovascular risk factors (CRFs) emerges, with the antecedent of the term coronary risk factor (RF), which was introduced in the United States of America following the results of the Framingham study in 1948, and is defined as the condition (biological, lifestyle-related, or acquired habits) that increases the probability of developing coronary pathology and identifying the population group most exposed to suffering it.[6] However, there are not sufficient references in the current medical literature regarding CRFs as a concept (despite the existence of countless citations about these factors), especially adapted to the Cuban context, since the latest definitions date from 2002, from the National Program for the Prevention and Control of Ischemic Heart Disease, and from Noya and Moya (2017), who state: "they are defined as those elements or circumstances that favor the formation of coronary atheromatosis. These factors are classified into two groups: modifiable and non-modifiable [...]; they may be predisposing or triggering",[7] which is considered incomplete in relation to the scientific advances of recent years, since CRFs tend to cluster with an additive and multiplicative effect of their deleterious effects.

In Europe, a declining trend in CVD mortality has been observed since the early 21st century. By 2014, the lowest coronary mortality rates were recorded, with reductions of 46% in Denmark, 44% in Portugal, and 40% in the Netherlands over the preceding decade.[8]

In Latin America and the Caribbean, CVD accounts for 31% of all deaths. Acute myocardial infarction (AMI) causes approximately 8% of deaths in Chile and predominantly affects men over 45 years and women over 60 years. In Brazil, one in three deaths annually is attributed to AMI, making it the leading cause of death. Inequitable access to healthcare services remains a major issue in South America, increasing complications, particularly among socioeconomically vulnerable populations. Additionally, demographic changes have increased the burden of CVD among older adults, who often present with multiple comorbidities.[8]

Cuba reflects this global trend. According to the 2022 Health Statistical Yearbook, heart disease has remained the leading cause of death since 2000. That year, 32 872 deaths were reported, corresponding to a rate of 2967 per 100 000 in-

habitants and a sustained increase in years of potential life lost. In the province of Villa Clara, the situation is even more critical, with 3075 deaths in 2022 (rate: 3973 per 100 000 inhabitants, higher than the national average) and it is estimated that 29 327 people suffer from IHD.[9]

The risk-based approach is essential for the prevention and control of IHD, as it allows identification of high-risk subgroups and guides targeted interventions at individual, family, and community levels. However, in the health area of the Policlínico Docente Universitario XX Aniversario, the actual behavior of CVRFs and their strength of association with IHD in the adult population remains unknown. This lack of information limits the ability of the primary healthcare teams to plan, implement, and evaluate effective preventive strategies.

Therefore, this study aims to identify cardiovascular risk factors associated with ischemic heart disease in adult patients at the Policlínico Docente Universitario XX Aniversario.

Method

An analytical, observational, retrospective case-control study was conducted between May 2019 and February 2020 at the Policlínico Docente-Universitario XX Aniversario in the municipality of Santa Clara, province of Villa Clara.

-Population and Sample

The study population consisted of adults aged 50 years or older residing in the polyclinic's health care area with active individual medical records in the family doctor's office.

-Inclusion and Exclusion Criteria

Cases: Individuals aged ≥50 years with a prior diagnosis of ischemic heart disease (chronic coronary syndrome, acute coronary syndrome, myocardial revascularization, as well as heart failure, cardiac arrhythmias, and sudden death of ischemic origin), documented in the individual medical record and confirmed by cardiology.

Controls: Individuals aged ≥50 years without a prior diagnosis or clinical evidence of IHD, selected from the same family doctor's office as the cases.

Exclusion criteria (both groups): Pregnancy, terminal illness, cognitive impairment preventing questionnaire completion, or refusal to participate.

A two-stage probabilistic sampling method was used to select 840 subjects. In the first stage, 20 family doctor's offices were randomly chosen from the 52 that make up the health area. In the second stage, 840 individuals were randomly selected from the family doctor's offices included in the study, stratified into two groups: 420 cases (individuals with a confirmed diagnosis of ischemic heart disease) and 420 controls (individuals without such a diagnosis), matched by age (± 3 years) and sex. The sample size was calculated to detect an odds ratio of 2.0 for the main exposure factors, with 80% power and a 95% confidence level, assuming an exposure prevalence of 20% in the controls.

-Study Variables

Variables were grouped into four domains: The first dimension, sociodemographic, included age (in completed years), sex (male or female), skin color (white or non-white, based on self-report), educational level (upper secondary or higher: yes or no), marital status (with partner or without partner), and employment status (yes or no). The second dimension corresponded to pathological history: this included family medical history of ischemic heart disease in first-degree relatives (yes or no), as well as personal history of high blood pressure (yes or no), diabetes mellitus (yes or no), hypercholesterolemia (yes or no), smoking (yes, defined as smoking at least one cigarette daily in the past year), and alcohol use (yes, defined as consumption of three or more alcoholic drinks per week in men, or two or more in women).

The third dimension, related to lifestyle factors, included salt intake (high: daily intake of more than 5g of table salt; normal: intake of less than 5g of table salt per day), consumption of animal-origin saturated fats (high: daily consumption of animal fats and at least one serving of non-lean pork or red meat; normal: three or fewer times per week), history of depression (yes or no, based on prior diagnosis and/or treatment by psychology and/or psychiatry), history of stress (yes or no, based on prior diagnosis and/or treatment by psychology and/or psychiatry), time spent on physical activity (active: engaging in moderate physical activity five or more times per week for at least 30 minutes

per session; inactive: engaging in physical activity fewer than five times per week for less than 30 minutes per session), fruit and vegetable consumption (adequate: daily consumption of ≥200g of fruits and vegetables or two to three servings of each daily; low: fewer than three servings per day), and fish consumption (adequate: 1-2 times per week; low: fewer than two servings per week). Finally, the fourth dimension comprised anthropometric measurements. Abdominal circumference: elevated if it was ≥94 cm in men or ≥80 cm in women, according to the criteria of the World Health Organization (WHO).[10] Waist-to-height ratio: elevated if it was equal to or greater than 0.5 for both sexes. Conicity index: elevated if it was equal to or less than 1.28 in men or 1.25 in women. All anthropometric measurements were performed by trained personnel, following standardized technical procedures.

-Data Collection

Data were obtained through direct interviews using a structured questionnaire and through review of individual medical records to confirm diagnoses and medical history.

The fieldwork was carried out by two trained surveyors who were blinded to the specific objective of the study in order to minimize biases.

-Statistical Analysis

The data were processed using the Statistical Product and Service Solutions (SPSS) program, version 20.0 for Windows. A descriptive analysis was performed using absolute and relative frequencies for qualitative variables.

In the bivariate analysis, the Chi-square test with Yates' correction (or Fisher's exact test, when expected frequencies were less than 5) was applied to compare the distribution of each variable between cases and controls. Associations with a p-value < 0.05 were considered statistically significant.

For variables that showed significant associations, the strength of the association was estimated using Cramer's V coefficient, with a 95% confidence interval, and the magnitude of the risk was assessed using the crude odds ratio (OR), with its 95% confidence interval.

The study was conducted in accordance with the Declaration of Helsinki[11] for research involving human subjects. Confidentiality of information was maintained by not publishing the identities of the individuals included in the study. No procedures or maneuvers were necessary that could cause physical or psychological harm to the subjects. The protocol was approved by the Research Ethics Committee and the Scientific Council of the Policlínico Docente Universitario XX Aniversario.

Results

Upon analyzing the results, **Table 1** describes the characteristics of the study subjects, where 58.5% were white. The majority (67.4%) were unemployed, while 57.1% were without partner and had no upper secondary education level. Only the upper secondary education level and skin color showed

Table 1. Distribution of patients according to sociodemographic risk factors

Variable	Ischemic heart disease		*p-value**
	Cases (%) n = 420	Control (%) n = 420	
Skin color			<0,001
White	272 (32,4)	219 (26,1)	
Non-white	148 (17,6)	201 (23,9)	
Marital status			0,240
With partner	194 (23,1)	212 (25,2)	
Without partner	226 (26,9)	208 (24,8)	
Upper secondary education level			<0,001
Yes	173 (20,6)	233 (27,7)	
No	247 (29,4)	187 (22,3)	
Employment status			0,015
Yes	120 (14,3)	154 (18,3)	
No	300 (35,7)	266 (31,7)	

*Chi-square test

Table 2. Distribution of patients according to the presence of family and personal pathological history

Variable	Ischemic heart disease		*p-value**
	Cases (%) n = 420	Control (%) n = 420	
Family history	321 (38,2)	247 (29,4)	<0,001
Personal history			
High blood pressure	272 (32,4)	204 (24,3)	<0,001
Diabetes mellitus	120 (14,3)	49 (5,8)	<0,001
Hypercholesterolemia	157 (18,7)	109 (13)	<0,001
Smoking	246 (29,3)	143 (17)	<0,001
Alcohol use	12 (1,43)	14 (1,7)	0,842

*Chi-square test

Table 3. Distribution of patients according to lifestyle

Variable	Ischemic heart disease		p-value*
	Cases (%) n = 420	Control (%) n = 420	
Salt intake			<0,001
High	235 (27,9)	144 (17,1)	
Normal	185 (22)	276 (32,9)	
Consumption of fat			<0,001
High	285 (33,9)	147 (17,5)	
Normal	135 (16,1)	273 (32,5)	
History of depression			0,457
Yes	27 (3,2)	21 (2,5)	
No	393 (46,8)	399 (47,5)	
History of stress			0,013
Yes	232 (27,6)	195 (23,2)	
No	188 (22,4)	225 (26,8)	
Time spent on physical activity			0,154
Active	98 (11,7)	116 (13,8)	
Inactive	322 (38,3)	304 (36,2)	
Fruit and vegetable consumption			0,038
Adequate	138 (16,4)	168 (20)	
Low	282 (33,6)	252 (30)	
Fish consumption			<0,001
Adequate	80 (9,5)	140 (16,7)	
Low	340 (40,5)	280 (33,3)	

*Chi-square test

a significant association (p<0.001), similar to the general distribution of the Cuban population.

When analyzing the family and personal medical history (**Table 2**), it was observed that the majority of subjects had a family history related to ischemic heart disease (67.6%), with 38.2% of the subjects in the case group. 56.7% of the entire sample were hypertensive, more frequently in the case group (32.4%), while 20.1% of the sample were diabetic. Hypercholesterolemia was present in 31.7% of the studied sample, but it was more common among subjects with ischemic heart disease. 46.3% of the individuals analyzed were active smokers, with a higher percentage in the control group (29.3%).

Habits and lifestyle factors are shown in **Table 3**. It is noteworthy that 29.7% of the cases consumed significantly more salt and 33.9% consumed more animal-derived fats, while also consuming less fish than the control group (only 9.5%). A similar pattern was observed in fruit and vegetable consumption (16.4%). Most individuals spent little time on physical activity (74.5%), as the group was mainly composed of elderly adults. However, no significant differences were found between cases and controls in this aspect, nor in terms of depression and/or stress history.

Table 4. Association of anthropometric measurements

Anthropometric measurements elevated	Ischemic heart disease		p-value*
	Cases (%) n = 420	Control (%) n = 420	
Abdominal circumference	284 (33,8)	80 (9,5)	<0,001
Waist-to-chest ratio	285 (33,9)	80 (9,5)	<0,001
Waist-to-hip ratio	284 (33,8)	80 (9,5)	<0,001

*Chi-square test

Regarding the anthropometric measurements taken, values above normal were predominant in both groups, with higher percentages observed in the cases, showing a significant association, as reflected in **Table 4**.

Figure 1 presents the strength of the association, measured by Cramer's V statistic, between ischemic heart disease and the studied cardiovascular risk factors, with 95% confidence intervals. The variables showing the strongest association were fat consumption, smoking, abdominal circumference, waist-to-hip ratio, and waist-to-chest ratio. However, factors with high prevalence in the sample, such as low fish consumption (present in 73.8%) and high blood pressure (observed in 56.7%), showed a weaker association.

In the bivariate analysis (**Figure 2**), adjusted for potential confounders and with a 95% confidence level, consumption of fat and hypercholesterolemia were the predictors with the greatest magnitude. Other factors, such as diabetes mellitus, smoking, and low fish consumption also showed significant associations, although with wider confidence intervals.

Discussion

In the present study, cardiovascular risk factors that showed an independent and significant association with ischemic heart disease, even with a stringent 95% confidence interval, included high

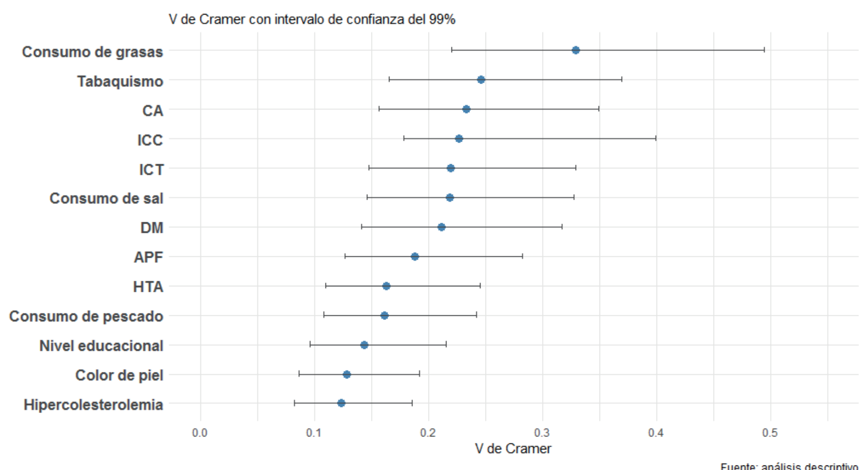

Fig. 1. Strength of association between ischemic heart disease and risk factors

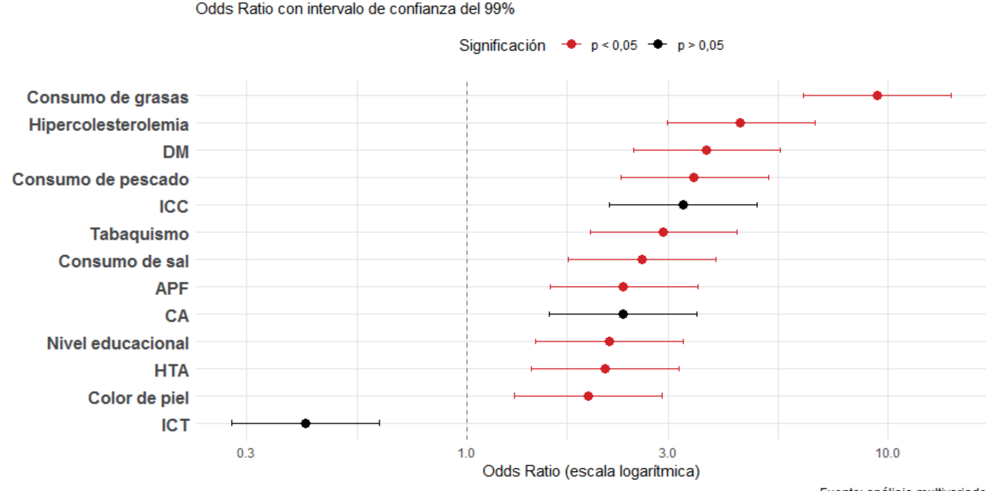

Fig. 2. Factors associated with ischemic heart disease

consumption of animal-origin fats, hypercholesterolemia, diabetes mellitus, low fish consumption, smoking, high salt intake, family history of ischemic heart disease, upper secondary education level, high blood pressure, and skin color. These results partially align with the international and national literature, although there are certain particularities that warrant comment.

Ischemic heart disease remains both a global and national health challenge due to the multifactorial nature of its pathophysiology, its complex management, and the large number of people affected by it, which is rising daily as life expectancy rises. This complex situation requires a multisectoral approach that starts with proper risk assessment and community stratification based on primary healthcare levels.

In the studied population, the percentage of diabetic individuals was similar to that found in other studies, where they represented 15.8%,[12] 22.1%,[13] and 26.8% in the population studied at the Hospital Provincial Universitario Celestino Hernández Robau of Santa Clara, with similar rates between both sexes.[14] The rates of hypercholesterolemia (31.7%) and animal fat consumption (33.9%) were also observed in individuals with ischemic heart disease, with behavior above the national average in Cuba, where 20% have at some point had dyslipidemia,[15] although this is lower than the study by Álvarez AE and colleagues.[16]

Hypertensive patients in the study had more than twice the risk of developing ischemic heart disease. This is related to the fact that in Cuba the prevalence of high blood pressure increases with age, as

demonstrated by studies such as the one conducted at the Policlínico Docente José Ávila Serrano in Gibara, Holguin, in 2011, where 61% of the population were hypertensive;[12] as well as the study by Reyes HL et al.[14] in Villa Clara, where 68.5% of patients had this condition. A similar trend is observed worldwide, as more than 75 million adults in the United States and over one billion people globally suffer from high blood pressure,[17] although this number is likely higher due to underreporting of the disease.

The probability of suffering from ischemic heart disease in smokers was nearly three times greater in the sample. Regular cigarette and/or tobacco use is one of the most common risk conditions associated with atherosclerosis and, consequently, ischemic heart disease. Its prevalence in this study was higher than reported by Reyes HL et al.[14], with a 35.7% incidence in their series, with unequal distribution by sex (40% in men and 29.4% in women), reflecting lifestyle patterns imposed by society. Traditionally, this habit is more prevalent among men. Rivera EL et al.[18] (in a study in La Lisa, Havana) reported an incidence of 34.4%, while Vega et al.[12] (in a study in Gibara) found an incidence of 26.6%.

Furthermore, 41% of households have at least one smoker,[15] which increases the risk, as smoking is an independent risk factor for ischemic heart disease in passive smokers.

In the United States, 2.5 million non-smokers have died since 1964 due to diseases caused by passive exposure to tobacco smoke, and 8.5% of individuals over 65 years old are addicted to smoking. Moreover, smoking accounts for 32% of deaths from ischemic heart disease.[3]

Diabetes mellitus, especially when not optimally controlled, has a devastating effect on the cardiovascular system and predisposes individuals to suffer a series of comorbidities and/or complications which drastically reduce quality of life and life expectancy. Consequently, diabetic individuals had a three-fold higher risk of severe coronary injury.

The magnitude of the association observed for high fat consumption presented a high odds ratio of 9.41, with 95% confidence intervals, far exceeding that reported in classic studies such as INTERHEART, where the odds ratio for dyslipidemia (expressed as the apolipoproteins ratio: apoB/apoA) was 3.87 globally[19] and 2.31 in Latin America.[20] This difference could be explained by the way fat consumption was measured. In the present study, the qualitative approach was based on the frequency of fatty meat consumption, which may capture a more extreme dietary pattern in the studied population, or perhaps by the high prevalence of this habit in the cases (67.9%) compared to the controls (35.0%). Hypercholesterolemia, as a quantitative measure, showed an odds ratio of 4.46, higher than the 3.52 observed in INTERHEART globally and the 2.31 in the Latin American study, reinforcing the importance of lipid abnormalities as a predictor of ischemic heart disease in the studied population.

Diabetes mellitus, with an odds ratio of 3.70, and smoking, with an odds ratio of 2.92, showed magnitudes similar to those reported in the INTERHEART Latin America study and slightly higher than those observed in the global study.[18,19] High blood pressure had an odds ratio of 2.13, which is also consistent with the values reported in the aforementioned studies, ranging between 1.8 and 2.5 depending on the region. These consistencies support the external validity of the findings of this research and confirm that these classical risk factors remain relevant in the adult Cuban population.

Furthermore, it is important to highlight that the high prevalence of diabetes mellitus and elevated blood cholesterol levels in individuals with chronic coronary syndromes, as well as their management, have been well documented in the guidelines of the European Society of Cardiology,[21-23] including those addressing high blood pressure.[24]

A notable finding is the low consumption of fish as an independent risk factor, with an odds ratio of 3.46, which is consistent with the accumulated evidence on the protective effects of omega-3 fatty acids. In Cuba, the Third National Survey of Risk Factors[15] reported that only 20% of the population consumes fish at the recommended frequency, a figure similar to the 19% observed in the study sample presented here. This result underscores

the need to promote fish consumption as a population-level preventive measure.

Regarding anthropometric measurements, the waist-to-hip ratio, abdominal circumference, and waist-to-chest ratio showed 95% confidence intervals that excluded unity, although their p-values exceeded 0.05.

This discrepancy may be due to the sensitivity of the Wald test to moderate sample sizes or correlations among variables. Nevertheless, the consistency of the confidence intervals suggests that central adiposity is a relevant factor, in line with studies demonstrating that these indices are better predictors of cardiovascular risk than body mass index3,5. In the bivariate analysis, all three measures showed highly significant differences ($p < 0.001$) and a moderate strength of association (Cramer's V: 0.219–0.233), reinforcing their importance. Future studies with larger samples could clarify the independent role of these factors.

An upper secondary educational level appeared as a protective factor based on its odds ratio, which is interpreted as indicating that its absence increases risk, in line with the well-known social gradient of cardiovascular diseases. A higher educational level is often associated with better lifestyle habits and greater access to health information. Similarly, skin color showed an independent association, although this result should be interpreted with caution, as it may reflect unmeasured socioeconomic inequalities rather than a direct biological effect.

It is noteworthy that time spent on physical activity and a history of depression were not significantly related from a statistical standpoint. However, fruit and vegetable consumption did show a relationship. The lack of association with physical activity could be explained by the high prevalence of sedentary behavior in both groups. Additionally, the measurement of these variables through self-reporting may have introduced some classification bias.

Several limitations must be considered in this study. First, the case-control design prevents establishing temporality and is susceptible to recall bias, especially regarding the reporting of dietary habits and lifestyle choices. Second, although multiple factors were adjusted for in the multivariate analysis, other potential confounders, such as detailed socioeconomic status, adherence to pharmacological treatments for ischemic heart disease, or exposure to environmental pollution, were not measured. Third, the geographical scope being limited to a single polyclinic restricts the generalizability of the results to other regions of the Villa Clara province.

The results confirm that in the adult population of the Policlínico Docente Universitario XX Aniversario, classic cardiovascular risk factors are strongly associated with ischemic heart disease, and they highlight the need to intensify preventive interventions focusing on consumption of fat, the detection and control of hypercholesterolemia and diabetes mellitus, the promotion of fish consumption, and smoking cessation. Given that many of these factors are modifiable, addressing them through primary care could help reduce the high burden of cardiovascular disease observed in Villa Clara and Cuba. The collected data contribute to studies on risk scales applied in the country, which have been extrapolated from other regions due to the absence of a predictive tool derived from Cuban populations.[25]

Conclusion

In the studied population, cardiovascular risk factors that showed an independent and significant association with ischemic heart disease were high animal fat consumption, hypercholesterolemia, diabetes mellitus, low fish consumption, smoking, and a family history of cardiovascular disease.

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