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ORIGINAL

Cardiometabolic risk assessment in 28300 spanish waiters

Valoración del riesgo cardiometabólico en 28300 camareros españoles

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Summary

Introduction and objectives: Cardiometabolic pathologies are highly prevalent and will cause high morbimortality throughout the world. These pathologies are multifactorial and have been related in some cases to sociodemographic factors. The aim of this study is to assess the cardiometabolic risk in a group of workers such as waiters who have been little or not studied at all.
Methods: Descriptive, cross-sectional study of 28300 Spanish waiters in which different scales of cardiometabolic risk such as obesity, insulin resistance, nonalcoholic fatty liver disease, metabolic syndrome, atherogenic indices or cardiovascular risk scales such as SCORE, REGICOR or vascular age were assessed.
Results: There was a high prevalence of high values for the different cardiometabolic risk scales analyzed, especially in men, this being particularly relevant since the mean age of the participants was low, 36 years in men and 33.9 years in women.
Conclusions: The waiters, who belong to the group of manual workers, present a high prevalence of cardiometabolic risk scales such as obesity, insulin resistance, nonalcoholic fatty liver disease or metabolic syndrome.

Key words: Cardiometabolic risk, manual workers, metabolic syndrome, insulin resistance, obesity, nonalcoholic fatty liver disease.

Resumen

Introducción y objetivos. Las patologías cardiometabólicas son altamente prevalentes y van a ocasionar una elevada morbimortalidad en todo el mundo. Este conjunto de patologías son multifactoriales y han sido relacionadas en algunos casos con factores sociodemográficos. El objetivo de este estudio es valorar el riesgo cardiometabólico en un colectivo de trabajadores como son los camareros que han sido poco o nada estudiados.
Material y métodos. Estudio descriptivo y transversal en 28300 camareros españoles en los que se valoran diferentes escalas de riesgo cardiometabólico como obesidad, resistencia a la insulina, hígado graso no alcohólico, síndrome metabólico, índices aterogénicos o escalas de riesgo cardiovascular como SCORE, REGICOR o edad vascular.
Resultados. Existe una alta prevalencia de valores altos de las diferentes escalas de riesgo cardiometabólico analizadas, especialmente en los varones, siendo este dato especialmente relevante ya que la edad media de los participantes era baja, 36 años en los hombres y 33,9 años en las mujeres.
Conclusiones. Los camareros, que pertenecen al grupo de trabajadores manuales presentan una elevada prevalencia de escalas de riesgo cardiometabólico como obesidad, resistencia a la insulina, hígado graso no alcohólico o síndrome metabólico.

Palabras clave: Riesgo cardiometabólico, trabajadores manuales, síndrome metabólico, resistencia a la insulina, obesidad, hígado graso no alcohólico.

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Introduction

The World Health Organization (WHO) states that cardiovascular diseases (CVD) are the leading cause of morbidity and mortality worldwide. They accounted for 27.9% of deaths in Spain in 2019[1], making them the leading cause of death in our country. Pathophysiological and biochemical factors, together with environmental factors, contribute to the appearance and development of CVD[2], and its etiology is complex and multifactorial. One of the great challenges for public health is the inequality in health linked to social class among these factors[3]. Thus, members of the most disadvantaged social classes have worse health indicators in terms of lifestyles, morbidity and mortality, and access to medical services[4]. Indicators of socioeconomic position such as income, educational level, employment status and type of employment contribute to these disparities[5]. Non-manual workers who are generally more skilled and manual workers who are generally less skilled have differences in cardiovascular mortality rates. Both men and women who work manually have a higher mortality rate[5].

The occupational diseases of hospitality workers, including waiters, have been studied in depth, most of which belong to the field of musculoskeletal pathologies, among which we would highlight carpal tunnel syndrome[6-8] and epicondylitis[9]. Dermatitis[10] is also very prevalent in this group. However, there are few studies that assess the prevalence of cardiometabolic disorders in hospitality workers and specifically in waiters, and for this reason the aim of this study is to assess the level of cardiometabolic risk in a large group of Spanish waiters by applying a large number of risk scales.

Methods

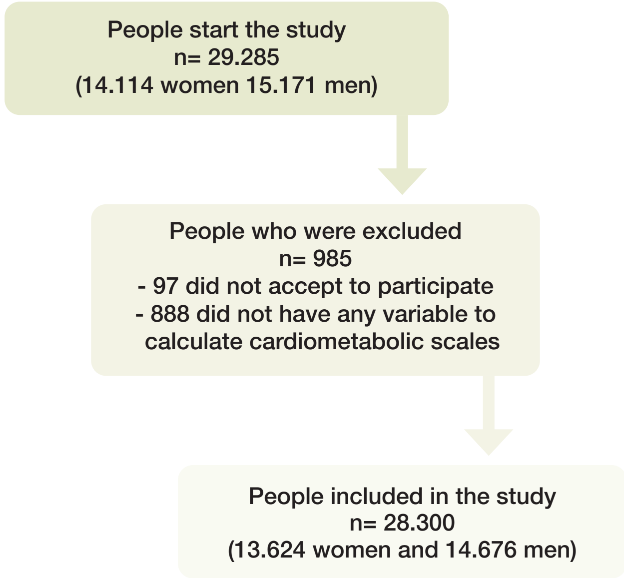
Between January 2019 and December 2019, a descriptive, cross-sectional study was conducted on 28300 waiters from different regions of Spain (Balearic Islands, Andalusia, Canary Islands, Valencian Community, Catalonia, Madrid, Castilla La Mancha, Castilla Leon and Basque Country). The waiters in the study were chosen from among those who attended medical examinations in the various participating companies.

A series of inclusion criteria were established:

- Age between 18 and 69 years.
- Working in one of the companies participating in the study.
- Agreeing to participate and providing the data to carry out the study.

The flow diagram is shown in **figure 1**.

Figure 1: Flow chart of the study participants.



Determination of variables

The anthropometric, analytical and clinical variables required to calculate the various cardiometabolic risk scales were determined by the health professionals of the different participating companies. The measurement techniques were standardized to reduce potential biases in obtaining the variables.

When the person was in an upright position and with the abdomen relaxed. Height and weight were measured using an approved SECA model scale-measuring scale. In this position, the abdominal waist circumference was determined using a tape measure placed parallel to the ground at the level of the last rib.

The OMROM-M3 sphygmomanometer was used to measure blood pressure. Three measurements were taken with an interval of one minute between each and the mean of the three was obtained after ten minutes of rest.

After a fast of no less than twelve hours, different methods were used to determine the analytical variables, including enzymatic techniques for blood glucose, triglycerides and total cholesterol, as well as precipitation techniques for HDL cholesterol. The Friedewald formula was used to calculate LDL-cholesterol, which is valid for triglyceride values up to 400. All analytical parameters were expressed in milligrams per deciliter.

The following were considered altered values: 200 mg/dL cholesterol, 130 mg/dL LDL and 150 mg/dL triglycerides, or if they were under treatment for any of these analytical alterations.

The recommendations of the American Diabetes Association[11] were used to classify blood glucose levels. Patients with a previous diagnosis, those who had a blood glucose greater than 125 mg/dL or had an HbA1c of at least 6.5% or were receiving treatment to reduce blood glucose were classified as diabetic.

Weight (in kg) was divided by height squared in meters to calculate BMI. Obese was considered obese at 30 kg/m^2 and above.

Scales for calculating the percentage of body fat:

- CUN BAE (Estimador de Adiposidad Corporal de la Clínica Universitaria de Navarra)[12].

-44.988 + (0.503 × age) + (10.689 × sex) + (3.172 × BMI) - (0.026 × BMI^2) + (0.181 × BMI × sex) - (0.02 × BMI × age) - (0.005 × BMI^2 × sex) + (0.00021 × BMI^2 × age). Male =0 Female =1.

- ECORE-BF (Equation Córdoba for Estimation of Body Fat)[13]

97.102+0.123 (age) +11.9 (sex) +35.959 (LnBMI) Man =0 Woman =1.

- Palafolls formula[14]

Man =[(BMI/waist) ×10] +BMI.
Woman =[(BMI/waist) ×10] +BMI+10.

- Fórmula Deuremberg[15]

1.2×(BMI) +0.23×(age) −10.8×(sex) −5.4 Man =0 Woman =1.

- Relative fat mass (RFM)[16]

Women: 76- (20 × (height/waist)) Men: 64- (20 × (height /waist)).

Other indicators related to overweight and obesity:

- Visceral adiposity index (VAI)[17]

It has different formulas for women and men.
Men: (Waist/(39,68 + (1,88 x BMI)) x (Triglycerides/1,03) x (1,31/HDL)
Women: (Waist/(36,58 + (1,89 x BMI)) x (Triglycerides/0,81) x (1,52/HDL)

- Body roundness index (BRI)[18]

BRI=364.2–365.5 × √1-[(waist/ (2π) 2)/(0.5 × height)^2].

- Body Surface Index (BSI)[19]. BSA is calculated by applying the DuBois formula, where weight is measured in kg and height in cm.

BSA = $weight^{0,425}$ x $height^{0,725}$ x 0,0007184
BSI = weight/√BSA

- Conicity index[20]

CI = (Waist/0,109) x 1/√ weight/height

- Body shape index (ABSI)[21]

ABSI = Waist/$BMI^{2/3}$ x $height^{1/2}$

- Normalized weight-adjusted index (NWAI)[22]

NWAI = (weight /10) - (10 x height) + 10
Weight in kg and height in meters.

Other indicators related to cardiovascular risk:

- Triglyceride glucose index[23], Triglyceride glucose index-BMI[24], Triglyceride glucose index-waist[25]

TyGindex = LN (triglycerides [mg/dl] × glycaemia [mg/dl] /2) .
TyGindex – BMI = TyGindex × BMI
TyGindex – waist = TyGindex × waist

- Waist triglyceride index[26]

waist (cm) × triglycerides(mmol)

- Cardiometabolic index[27].

Waist/height × triglycerides/HDL

Nonalcoholic fatty liver disease risk scales:

- Fatty liver index[28].

FLI = ($e^{0.953*\log_e (triglycerides) + 0.139*BMI + 0.718*\log_e (GGT) + 0.053*waist\ circumference - 15.745}$) / (1 + $e^{0.953*\log_e (triglycerides) + 0.139*BMI + 0.718*\log_e (GGT) + 0.053*waist\ circumference - 15.745}$) x 100

- Hepatic steatosis index (HSI)[29]

HSI = 8 × AST/ALT + BMI (+ 2 if 2 diabetes and + 2 if woman)

- Zhejiang University index (ZJU)[30]

BMI + Glycaemia (mmol L) +Triglycerides(mmol L) +3 AST/ALT +2 if woman

- Fatty liver disease index (FLD)[31]

BMI+ triglycerides +3 × (AST/ALT) +2 ×Hiperglucemia (presence=1; absence=0)
If BMI ≥28 = 1 poit, AST/ALT ≥ 0,8 = 2 points, diabetes mellitus type 2 = 1 point. Cutt off high risk 2 points.

- Men= (waist (cm) – 65) × (triglycerides (mMol))
- Women: (waist (cm) – 58) × (triglycerides (mMol))
- Lipid accumulation product (LAP)[32].

Men= (waist (cm) - 65) × (triglycerides (mMol)).
Women: (waist (cm) - 58) × (triglycerides (mMol))

Atherogenic indexes[33].

- Total cholesterol/HDL (high values > 5 in men and > 4,5 in women).
- LDL/HDL (high values >3)
- logTriglycerides/HDL (high values >3)
- Total cholesterol -HDL (high values >130)

Metabolic syndrome

- The metabolic syndrome was determined using three models[34]:

(a) NCEP ATP III (National Cholesterol Educational Program Adult Treatment Panel III) considers metabolic syndrome when there are three or more of the following factors: blood pressure greater than 130/85 mmHg; triglycerides greater than 150 mg/dl or specific treatment for this lipid disorder; HDL low and glycaemia ≥ 100 mg/dl or specific treatment for this glycemic disorder.

b) The International Diabetes Federation (IDF) model establishes as essential a waist circumference greater than 80 centimeters in women and greater than 94 centimeters in men, in addition to two of the other factors mentioned above for ATP III (triglycerides, HDL, blood pressure and glycemia).

c) The JIS (Joint Interim Statement) model, which follows the same criteria as the NCEP ATP III but with waist circumference cut-off points of 80 cm for women and 94 cm for men.

Atherogenic dyslipidemia[35] is characterized by high triglyceride concentrations (>150 mg/dL) and low HDL; if it also presents high LDL values, it is considered a lipid triad[36].

Cardiovascular risk scales:
The REGICOR scale[37], which is an adaptation of the Framingham scale to the Spanish population, evaluates the risk of suffering a cardiovascular event during a 10-year period. It can be used between the ages of 35 and 74 years. The risk is considered to be moderate from 5% and high from 10%.

We calculated the SCORE2[38] (Systematic Coronary Risk Evaluation) scale, which measures the risk of suffering a fatal stroke within 10 years.

ERICE (Spanish Cardiovascular Risk Equation) is based on 7 Spanish population-based cohort studies[39]. It estimates the risk of suffering a fatal or non-fatal cerebrovascular event over a 10-year period. The tables are used in persons between 30 and 80 years of age. To calculate the risk, age, sex, smoking, diabetes, systolic blood pressure, antihypertensive treatment and total cholesterol are assessed. To classify the level of cardiovascular risk with the ERICE tables, the cut-off points recommended by the group responsible for the study were used: moderate risk was considered moderate if it exceeded 5%, moderate-high if it was between 15%-19%, high if it was between 20% and 39%, and very high if it exceeded 39%.

Using the Framingham model[40] to calculate vascular age. Age, sex, HDL-c, total cholesterol, systolic blood pressure values, antihypertensive treatment, smoking and diabetes are the data we need to calculate it. It can be calculated from the age of 30 years.

The use of the SCORE[41] model to calculate vascular age. Age, sex, systolic blood pressure, smoking and total cholesterol are used to calculate it. It can be calculated in people aged 40 to 65 years, like the scale from which it is derived.

Avoidable years of life lost (ALLY)[42], which can be defined as the difference between vascular and biological age, is an interesting concept that applies to both vascular ages.

Results

Table I shows the characteristics of the sample. The mean age was approximately 35 years, the majority group being between 18 and 39 years of age. More than 34% were smokers (slightly higher in women). All the variables presented more favorable values in women.

Table II shows the mean values of the different cardiometabolic risk scales analyzed, separated by sex. Both the scales that assess overweight-obesity (except those that estimate body fat) and those that determine the risk of insulin resistance, nonalcoholic fatty liver disease, cardiovascular risk or atherogenic risk almost always present significantly higher values in male waiters. In all cases except for the liver fibrosis risk scale (BARD scoring), the differences observed between the sexes were statistically significant.

Table I: Characteristics of the population.

	Men n=14.676	Women n=13.624	
	Mean (SD)	**Mean (SD)**	**p-value**
Age (years)	36.0 (12.1)	33.9 (10.5)	<0.0001
Height (cm)	174.7 (6.9)	162.4 (6.3)	<0.0001
Weight (kg)	76.7 (13.1)	62.2 (12.0)	<0.0001
Waist circumference (cm)	83.7 (10.5)	72.7 (8.9)	<0.0001
Systolic blood pressure (mmHg)	125.6 (14.6)	114.7 (14.0)	<0.0001
Diastolic blood pressure (mmHg)	75.4 (10.7)	70.2 (9.7)	<0.0001
Total cholesterol (mg/dl)	183.6 (40.2)	181.3 (34.7)	<0.0001
HDL-cholesterol (mg/dl)	51.5 (7.9)	57.9 (7.4)	<0.0001
LDL-cholesterol (mg/dl)	108.3 (37.1)	107.0 (34.4)	0.003
Triglycerides (mg/dl)	122.1 (94.1)	82.0 (40.2)	<0.0001
Glycaemia (mg/dl)	89.4 (20.1)	84.5 (12.9)	<0.0001
ALT (U/L)	29.0 (22.0)	19.9 (15.7)	<0.0001
AST (U/L)	24.3 (11.4)	17.7 (5.9)	<0.0001
GGT (U/L)	32.1 (34.2)	19.4 (20.2)	<0.0001
Creatinine (mg/dl)	0.9 (0.2)	0.7 (0.1)	<0.0001
	%	**%**	**p-value**
18-29 years	36.7	40.7	<0.0001
30-39 years	26.3	31.3	
40-49 years	19.7	17.9	
50-59 years	14.4	8.9	
60-69 years	2.9	1.2	
Non-smokers	66.0	65.1	0.140
Smokers	34.0	34.9	

Table II: Differences in mean values of the scales related with cardiovascular risk by sex using the T-Student test.

	Men n=14.676	Women n=13.624	
	Mean (SD)	Mean (SD)	p-value
Waist to height ratio (WtHR)	0.48 (0.06)	0.45 (0.05)	<0.0001
Body mass index (BMI)	25.1 (4.0)	23.6 (4.3)	<0.0001
CUN BAE	22.6 (6.7)	32.0 (6.7)	<0.0001
ECORE-BF	22.8 (6.3)	32.0 (6.6)	<0.0001
Relative fat mass	21.7 (5.1)	30.7 (4.9)	<0.0001
Palafolls formula	28.1 (4.2)	36.8 (4.6)	<0.0001
Deurenberg formula	22.2 (6.4)	30.7 (6.2)	<0.0001
Body fat index	20.5 (7.5)	25.5 (6.5)	<0.0001
Body surface index	55.2 (7.1)	48.0 (7.0)	<0.0001
Normalized weight adjusted index	0.20 (1.2)	-0.02 (1.16)	<0.0001
Body roundness index	3.0 (1.1)	2.5 (0.9)	<0.0001
Body shape index	0.074 (0.006)	0.070 (0.006)	<0.0001
Visceral adiposity index	6.8 (6.2)	2.4 (1.3)	<0.0001
Conicity index	1.2 0.1	1.1 0.1	<0.0001
METS-VF	6.0 (0.8)	5.2 (0.8)	<0.0001
Waist triglyceride index	117.3 94.2	68.0 37.1	<0.0001
Waist weight index	9.6 (0.8)	9.3 (0.7)	<0.0001
nº factors metabolic syndrome NCEP ATPIII	1.0 (1.1)	0.6 (0.9)	<0.0001
nº factors metabolic syndrome JIS	1.4 (1.2)	0.6 (0.9)	<0.0001
Total cholesterol/HDL-c	3.7 (1.1)	3.2 (0.8)	<0.0001
Triglycerides/HDL-c	2.5 (2.2)	1.5 (0.8)	<0.0001
LDL-c/HDL-c	2.2 (0.9)	1.9 (0.7)	<0.0001
Total cholesterol-HDL-c	132.2 (42.3)	123.4 (36.4)	<0.0001
Cardiometabolic index	1.2 (1.1)	0.7 (0.4)	<0.0001
Triglyceride glucose index (TyG index)	8.4 (0.6)	8.0 (0.4)	<0.0001
TyG index-BMI	212.2 (42.4)	190.2 (39.9)	<0.0001
TyG index-waist circumference	705.7 (113.7)	585.6 (85.7)	<0.0001
TyG index-WtHR	4.0 (0.6)	3.6 (0.5)	<0.0001
METS-IR	36.5 (7.6)	32.2 (6.9)	<0.0001
ALLY vascular age SCORE	7.5 (6.8)	3.9 (4.9)	<0.0001
SCORE scale	1.8 (2.2)	0.4 (0.8)	<0.0001
ALLY vascular age Framingham	5.6 (9.9)	-1.0 (10.3)	<0.0001
REGICOR scale	3.3 (2.2)	2.8 (2.2)	<0.0001
ERICE scale	4.2 (5.0)	2.1 (2.7)	<0.0001
Fatty liver index	30.1 (25.2)	12.3 (16.5)	<0.0001
Hepatic steatosis index	35.8 (5.9)	34.5 (5.9)	<0.0001
Zhejiang University index	36.3 (5.1)	34.9 (5.2)	<0.0001
Fatty liver disease	31.2 (4.7)	28.2 (5.0)	<0.0001
BARD scoring	1.6 (1.1)	1.7 (0.9)	0.110
Lipid accumulation product	27.7 (30.2)	14.3 (13.8)	<0.0001

CUN BAE Clinica Universitaria Navarra Body Adiposity Estimator; ECORE-BF Equation Córdoba for Estimation of Body Fat; METS-VF Metabolic score- visceral fat. ALLY Avoidable lost life years. SCORE Systematic COronary Risk Evaluation. REGICOR REgistre GIroni del COR. HDL-c High density lipoprotein cholesterol. LDL Low density lipoprotein cholesterol. METS-IR Metabolic score for Insulin Resistance. TyG Triglyceride glucose index

Table III, which evaluates the prevalence of elevated values of the different cardiometabolic risk scales in both sexes, shows a situation similar to that already mentioned with the mean values, that is, there is a higher prevalence in men. In this case, all the differences observed were statistically significant.

Table IV, which presents the results of the multinomial logistic regression analysis, shows that the variable that most increases the risk of presenting elevated values of the cardiometabolic scales is age, followed by sex (male), whereas smoking does not affect most of the scales. The highest odds ratios were found for SCORE, Deuremberg and diabesity in the case of age and for SCORE, METS-VF and hypertriglyceridemic waist for the male sex.

Discussion

The prevalence of elevated values of cardiometabolic risk scales in waiters can be considered overall as moderate in men and moderate-low in women. We would highlight the high prevalence of high values of the scales that estimate body fat, dyslipidemia, atherogenic and cardiovascular risk, especially considering that the mean age of the population is low.

We have not found in the literature consulted references to studies analyzing cardiometabolic risk in hospitality workers, nor specifically in waiters, for this reason we are going to compare our results with similar work groups at a socioeconomic level, that is, with people of lower socioeconomic levels.

In a study carried out in 5,370 Spanish farmers (3,695 men and 1,675 women) with an average age of around[41] years, different scales of cardiometabolic risk were analyzed. A high percentage of the farmers were found to have obesity, hypertension, hypertriglyceridemia, hypercholesterolemia, metabolic syndrome, nonalcoholic fatty liver disease, and elevated REGICOR and SCORE values, data similar to those found by us in this group of waiters[43]. This same group conducted a study in 1094 male Bolivian miners and found similar risk levels[44].

Table III: Differences in the prevalence of altered values of different scales related with cardiovascular risk by sex using the chi-square test.

	Men n=14.676	Women n=13.624	
	%	%	p-value
Waist to height ratio > 0.50	33.1	12.3	<0.0001
Body mass index obesity	11.1	8.2	<0.0001
CUN BAE obesity	35.9	29.7	<0.0001
ECORE-BF obesity	36.4	29.2	<0.0001
Relative fat mass obesity	26.6	37.8	<0.0001
Palafolls formula obesity	77.0	59.6	<0.0001
Deuremberg formula obesity	32.7	46.7	<0.0001
METS-VF high	4.4	0.4	<0.0001
Diabesity	1.5	0.6	<0.0001
Hypertension	21.8	7.6	<0.0001
Total cholesterol ≥ 200 mg/dl	31.4	27.1	<0.0001
LDL-c ≥ 130 mg/dl	27.7	23.3	<0.0001
Triglycerides ≥ 150 mg/dl	23.0	5.9	<0.0001
Glycaemia 100-125 mg/dl	12.5	5.9	<0.0001
Glycaemia ≥ 126 mg/dl	2.4	0.6	<0.0001
Metabolic syndrome NCEP ATPIII	10.7	4.2	<0.0001
Metabolic syndrome IDF	7.7	4.2	<0.0001
Metabolic syndrome JIS	19.6	5.0	<0.0001
Atherogenic dyslipidemia	5.4	2.1	<0.0001
Lipid triad	1.6	0.4	<0.0001
Hipertriglyceridemic waist	6.3	0.7	<0.0001
Total cholesterol/HDL-c moderate-high	11.2	6.4	<0.0001
Triglycerides/HDL-c high	23.7	4.6	<0.0001
LDL-c/HDL-c high	18.7	7.9	<0.0001
Total cholesterol-HDL-c high	49.3	39.7	<0.0001
METS-IR high	5.8	2.8	<0.0001
TyG index high	24.3	8.1	<0.0001
LAP high	29.9	15.6	<0.0001
Fatty liver index high risk	15.9	3.6	<0.0001
SCORE scale moderate-high	28.6	3.5	<0.0001
REGICOR scale moderate-high	21.0	16.7	<0.0001
ERICE scale moderate-high	11.7	1.5	<0.0001

CUN BAE Clinica Universitaria Navarra Body Adiposity Estimator; ECORE-BF Equation Córdoba for Estimation of Body Fat; METS-VF Metabolic score- visceral fat. ALLY Avoidable lost life years. SCORE Systematic COronary Risk Evaluation. REGICOR REgistre GIroni del COR. HDL-c High density lipoprotein cholesterol. LDL Low density lipoprotein cholesterol. METS-IR Metabolic score for Insulin Resistance. TyG Triglyceride glucose index. LAP Lipid accumulation product

Different studies carried out by our group in large groups of workers have found a relationship between belonging to the most disadvantaged social classes and presenting high prevalence of different cardiometabolic risk scales such as nonalcoholic fatty liver disease[45], obesity[46], vascular age[47], or metabolic syndrome[48], among others.

A study carried out in Danes aged 18 to 25 years in which the relationship between low socioeconomic status and the prevalence of cardiometabolic risk was assessed concluded that there was an inverse relationship between them, such that the prevalence was higher in people from the lowest socioeconomic stratum[49.]

A study carried out in 2650 Chinese adults showed a higher prevalence of cardiometabolic disorders, especially metabolic syndrome, in groups belonging to the poorest socioeconomic groups[50]. This same relationship between metabolic syndrome and low socioeconomic status was observed in another study carried out in a young population in Iran[51].

A study of 15,057 elderly Spanish workers in different occupations, in which different cardiometabolic risk scales were assessed, showed that in addition to male sex and tobacco consumption, one of the factors influencing the prevalence of cardiometabolic disorders such as non-alcoholic fatty liver disease or obesity was belonging to the group of manual workers[52]. An Indonesian study of 137,378 workers found that manual workers were more likely to report symptoms of cardiovascular disease than non-manual workers[53].

Strengths and limitations

Among the strengths of the study, we would highlight the large sample size, in both sexes, and the large number of cardiometabolic risk scales analyzed. It is also one of the first, if not the first article to specifically assess the cardiometabolic level of waiters, so that this study could become a reference for further research in this group of workers.

The main limitation is that most of the cardiometabolic risk parameters were not determined using objective methods but by applying risk scales.

Conclusions

The waiters analyzed in this study, despite their youth, presented higher prevalences of the different cardiometabolic risk scales than expected in persons of this age.

The variables that most increase the risk of presenting high values of all the cardiometabolic risk scales are age followed by sex (male), while smoking does not influence in most cases.

Conflict of Interest

The authors declared that there is no conflict of interest.

Table IV: Multinomial logistic regression.

	≥ 50 years	Male	Smokers
	OR (95% CI)	OR (95% CI)	OR (95% CI)
WtHR < 0.50	1	1	1
WtHR ≥0.50	2.01 (1.87-2.17)	3.38 (3.18-3.60)	ns
BMI non obesity	1	1	1
BMI obesity	2.34 (2.13-2.57)	1.29 (1.19-1.40)	ns
CUN BAE non obesity	1	1	1
CUN BAE obesity	6.83 (6.33-7.36)	1.20 (1.14-1.27)	0.95 (0.90-0.99)
ECORE non obesity	1	1	1
ECORE obesity	6.48 (6.01-6.99)	1.23 (1.16-1.29)	0.94 (0.89-0.99)
RFM non obesity	1	1	1
RFM obesity	1.91 (1.78-2.05)	0.56 (0.54-0.59)	ns
Palafolls formula non obesity	1	1	1
Palafolls formula obesity	3.87 (3.49-4.29)	2.15 (2.04-2.27)	0.93 (0.88-0.99)
Deurenberg formula non obesity	1	1	1
Deurenberg formula obesity	18.23 (16.50-20.15)	0.40 (0.38-0.42)	0.93 (0.88-0.99)
METS-VF normal	1	1	1
METS-VF high	6.70 (5.73-7.83)	10.74 (7.99-14.43)	ns
Non hypertension	1	1	1
Hypertension	5.16 (4.78-5.58)	3.11 (2.88-3.36)	ns
Total cholesterol < 200 mg/dl	1	1	1
Total cholesterol ≥ 200 mg/dl	4.12 (3.84-4.42)	1.10 (1.05-1.16)	ns
LDL-c < 130 mg/dl	1	1	1
LDL-c ≥ 130 mg/dl	4.32 (4.03-4.64)	1.12 (1.06-1.19)	ns
Triglycerides < 150 mg/dl	1	1	1
Triglycerides ≥ 150 mg/dl	2.25 (2.07-2.45)	4.52 (4.17-4.91)	ns
Glycaemia < 126 mg/dl	1	1	1
Glycaemia ≥ 126 mg/dl	9.13 (8.01-10.41)	2.20 (1.90-2.54)	ns
Non metabolic syndrome NCEP ATPIII	1	1	1
Metabolic syndrome NCEP ATPIII	5.53 (5.03-6.08)	2.39 (2.16-2.65)	ns
Non metabolic syndrome IDF	1	1	1
Metabolic syndrome IDF	3.23 (2.90-3.60)	1.72 (1.55-1.91)	ns
Non metabolic syndrome JIS	1	1	1
Metabolic syndrome JIS	5.51 (5.08-5.98)	4.28 (3.91-4.68)	ns
Non atherogenic dyslipidemia	1	1	1
Atherogenic dyslipidemia	3.17 (2.78-3.62)	2.38 (2.07-2.74)	ns
Non lipid triad	1	1	1
Lipid triad	2.69 (2.10-3.44)	3.37 (2.53-1.48)	ns
Non Hipertriglyceridemic waist	1	1	1
Hipertriglyceridemic waist	1.82 (1.57-2.11)	8.50 (6.91-10.45)	ns
Total cholesterol/HDL-c normal	1	1	1
Total cholesterol/HDL-c high	4.88 (4.46-5.34)	1.59 (1.46-1.74)	ns
Triglycerides/HDL-c normal	1	1	1
Triglycerides/HDL-c high	4.56 (4.22-4.94)	2.44 (2.26-2.63)	ns
LDL-c/HDL-c normal	1	1	1
LDL-c/HDL-c high	5.71 (5.26-6.20)	1.34 (1.28-1.41)	ns
SCORE scale low	1	1	1
SCORE scale moderate-high	107.73 (82.21-141.18)	23.14 (18.45-29.02)	7.84 (6.50-9.45)
REGICOR scale low	1	1	1
REGICOR scale moderate-high	1.91 (1.76-2,08)	1.25 (1.15-1.35)	1.20 (1.11-1.30)
Fatty liver index low-moderate risk	1	1	1
Fatty liver index high risk	2.38 (2.15-2.64)	4.80 (4.31-5.35)	ns
LAP low	1	1	1
LAP high	2.21 (2.06-2.38)	2.20 (2.07-2.33)	ns
BARD score low	1	1	1
BARD score high	ns	0.55 (0.45-0.66)	ns
Non diabesity	1	1	1
Diabesity	11.25 (8.84-14.33)	1.77 (1.37-2.28)	0.73 (0.56-0.94)
METS-IR bajo	1	1	1
METS-IR alto	2.60 (2.28-2.95)	1.97 (1.74-2.23)	ns
TyG index low	1	1	1
TyG index high	2.81 (2.60-3.03)	3.41 (3.17-3.66)	ns

WtHR Waist to height ratio. BMI.Body mass index. CUN BAE Clinica Universitaria Navarra Body Adiposity Estimator; ECORE-BF Equation Córdoba for Estimation of Body Fat; METS-VF Metabolic score- visceral fat. ALLY Avoidable lost life years. SCORE Systematic COronary Risk Evaluation. REGICOR REgistre GIroni del COR. HDL-c High density lipoprotein cholesterol. LDL Low density lipoprotein cholesterol. METS-IR Metabolic score for Insulin Resistance. TyG Triglyceride glucose index. LAP Lipid accumulation product

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