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ORIGINAL

Influence of sociodemographic variables and healthy habits on the values of type 2 diabetes risk scales

Influencia de variables sociodemográficas y hábitos saludables en los valores de escalas de riesgo de diabetes tipo 2

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Abstract

Introduction: Type 2 diabetes is one of the most prevalent metabolic diseases worldwide and is responsible for a large number of complications. There are many factors that increase the risk of presenting this pathology.
Objectives: The aim was to assess the influence of sociodemographic variables and healthy habits on the values of different risk scales for type 2 diabetes.
Methodology: Observational, descriptive, cross-sectional study in 386924 Spanish workers. We assessed how different sociodemographic variables (age, sex, social class and level of education) and healthy habits (physical exercise, Mediterranean diet and smoking) influence the level of risk of presenting type 2 diabetes by applying different scales. Results. All the sociodemographic variables and healthy habits analyzed in this study will influence the values of the type 2 diabetes risk scales. Those that show the greatest influence are physical activity, Mediterranean diet, and age.
Conclusions: The profile of a person at high risk of developing diabetes according to the different scales is an elderly male, with a low socioeconomic level, sedentary, with low adherence to the Mediterranean diet and a smoker.

Key words: Diabetes, Mediterranean diet, physical activity, finrisk, tobacco, socioeconomic status.

Resumen

Introducción: La diabetes tipo 2 es una de las enfermedades metabólicas más prevalentes en todo el mundo y además es responsable de un gran número de complicaciones. Existen muchos factores que incrementan el riesgo de presentar esta patología.
Objetivos. Se pretende valorar la influencia de variables sociodemográficas y hábitos saludables en los valores de diferentes escalas de riesgo de diabetes tipo 2.
Metodología. Estudio observacional, descriptivo y transversal en 386924 trabajadores españoles. Se valora como diferentes variables sociodemográficas (edad, sexo, clase social y nivel de estudios) y hábitos saludables (ejercicio físico, dieta mediterránea y tabaco) influyen en el nivel de riesgo de presentar diabetes tipo 2 aplicando diferentes escalas.
Resultados. Todas las variables sociodemográficas y hábitos saludables analizados en este estudio van a influir en los valores de las escalas de riesgo de diabetes tipo 2. Los que muestran mayor influencia son la actividad física, la dieta mediterránea y la edad. Conclusiones. El perfil de persona con alto riesgo de presentar diabetes con las diferentes escalas es un varón de edad avanzada, nivel socioeconómico bajo, sedentario, con baja adherencia a la dieta mediterránea y fumador.

Palabras clave: Diabetes, dieta mediterránea, actividad física, finrisk, tabaco, estatus socioeconómico.

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Introduction

Diabetes is a chronic metabolic disease characterized by high blood glucose levels[1], which over time can lead to damage to various organs such as the heart[2], blood vessels[3], eyes[4], kidneys[5] and nervous system[6]. Type 2 diabetes, which occurs when the body becomes insulin resistant[7] or fails to produce enough insulin[8], is the most common type of diabetes. The prevalence of type 2 diabetes has been increasing significantly in all developed and developing nations over the past thirty years[9]. Type 1 diabetes, also known as insulin-dependent diabetes or juvenile diabetes, is a chronic genetic disease in which the pancreas produces little or no insulin[10].

Because type 2 diabetes is very common and persistent, treatment can be expensive for patients, their families, and the healthcare system[11]. Understanding the costs associated with these conditions and the consequences of inadequate care and management of the disease on society and the economy is essential for an appropriate approach[12,13]. According to experts, if diabetes education programs were successfully implemented and promoted[14], the overall costs of the disease could be significantly reduced and the quality of life of patients could be significantly improved[15]. The therapeutic measure with the greatest impact on reducing complications such as amputations, diabetic comas and days of hospitalization may be diabetes education[16].

Type 2 diabetes is a complex chronic noncommunicable disease, and like them is very complex and represents a challenge for society and health systems worldwide. The increase in the prevalence of type 2 diabetes worldwide has been attributed to a variety of socioeconomic[17], demographic[18] and environmental19 factors, as well as to the increase in risk factors for the development of diseases related to unhealthy lifestyles, such as low levels of physical activity[20] and overweight/obesity[21]. Type 2 diabetes therefore requires a comprehensive understanding that considers both the biological factors of individuals and the social context in which they develop.

The aim of this study is to determine how different sociodemographic variables and healthy habits affect the values of different scales that measure the risk of presenting type 2 diabetes.

Methods

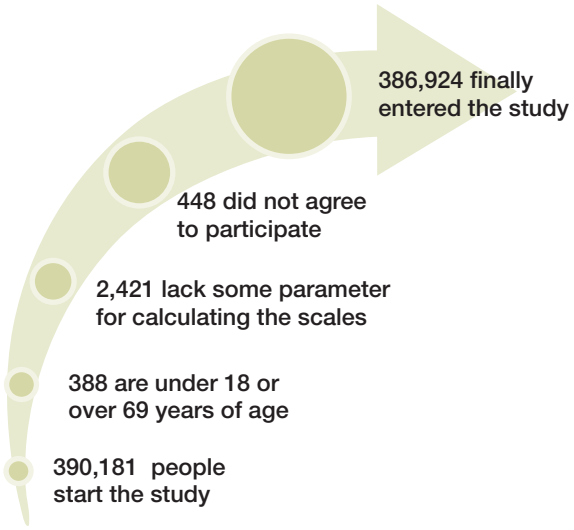
We conducted a study on a total of 386924 workers from different laboral sectors and who performed their activity in several Spanish autonomous communities. We retrieved the data from occupational medical check-ups, performed from January 2019 to June 2020.

The sample selection was made based on inclusion criteria that included:

- Age between 18 and 69 years.
- Existence of an employment contract in one of the companies participating in the study.
- Signing a consent form to participate in the study.
- Permission to use the data for epidemiological purposes.

The flow diagram of the study participants is shown in **figure 1**.

Figure 1: Flow-chart of participants in the study.



Determination of variables

Each of the health professionals of the participating companies was responsible for obtaining the data needed to calculate the different scales analyzed in this study. The data were obtained by means of:

- Clinical history. Including sociodemographic variables (age, sex, social class and level of education) and healthy habits (tobacco, alcohol, Mediterranean diet and physical activity).
- Anthropometric and clinical determinations. Includes height, weight, waist and hip circumference, systolic and diastolic blood pressure.
- Blood tests. These include lipid profile and blood glucose.

To mitigate the appearance of bias, the measurements of the different variables were standardized.

Weight and height were obtained with the worker standing upright and wearing only underwear. The arms are placed parallel to the thorax and the head must face forward. Measurements are taken with a SECA model scale-measuring device and the data are given in centimeters and kilograms.

The abdominal waist circumferencewas determined with a SECA model measuring tape placed at the level of the last floating rib and parallel to the floor. The worker was in a standing position with the abdomen relaxed. The hip circumference is obtained in the same position and placing the tape measure parallel to the floor at the level of the widest part of the gluteal area.

The OMROM-M3 blood pressure monitor was used to measure blood pressure. The person must be seated and at rest for at least ten minutes to be evaluated correctly. Cuffs of different sizes are available because they should be placed around the arm without being too tight. We perform three separate one-minute tests. The assessment was based on the average of the three figures.

Blood measurements were obtained by venous puncture and after a 12-hour fast. Samples are processed and stored refrigerated for proper preservation, never more than 48 to 72 hours. Reference laboratories use similar methodologies to analyze the samples. Blood glucose, total cholesterol and triglycerides are determined by enzymatic techniques, while HDL cholesterol is determined by precipitation techniques. The Friedewald formula, valid as long as triglycerides do not exceed 400 mg/dL, is used to indirectly estimate LDL cholesterol. If the value is higher than 400 mg/dL, LDL is determined directly. All analytical variables are shown in milligrams per deciliter.

Sex is stated as male and female.

Age is calculated by subtracting the date of birth from the date of the medical examination.

The educational level considered is the highest of all those taken. Primary, secondary and university studies are the three levels established.

The type of work is divided into two categories[22]:

- Non-manual. This includes managerial personnel, university-educated professionals, professional athletes and artists, intermediate professions and skilled self-employed workers.
- Manual. Includes low-skilled workers.

We consider a person to be a smoker if he/she has consumed any form of tobacco at least once a day in the last 30 days or has stopped smoking less than 12 months ago.

Adherence to the Mediterranean diet was determined by applying a fourteen-question questionnaire, which is scored with 0 or 1 point. Scores of 9 indicate high adherence to Mediterranean pattern[23].

The International Physical Activity Questionnaire (IPAQ) was used to determine a person's level of physical activity. The purpose of this self-administered questionnaire is to calculate the amount of physical activity performed in the last seven days[24].

The type 2 diabetes risk scales calculated are:

- Finrisk[25]. It needs for its calculation le age, sex, Body Mass Index (BMI), waist circumference, physical exercise, fruit and vegetable consumption, consumption of antihypertensive drugs, personal history of hyperglycemia and family history of diabetes. Values above 15 points are considered high.
- QDiabetes-score[26]. Its calculation uses age, sex, race, height, weight, blood glucose, smoking, history of stroke, family history of diabetes, use of antihypertensive drugs, presence of schizophrenia or depression, use of steroids or statins, history of polycystic ovary disease or gestational diabetes. Since there are no cut-off points, we considered high values when the relative risk presented values of 3 or more.
- Canrisk[27]. In order to calculate it, we need sex, age, physical activity, fruit and vegetable consumption, history of hypertension, history of hyperglycemia, family history of diabetes, ethnicity and education. Values above 43 indicate high risk.
- TRAQ-D[28]. Age, sex, BMI, family history of diabetes, smoking, and race are required.
- Oman[29]. We require age, waist circumference, body mass index, family history of diabetes and hypertension status.

Ethical considerations and aspects

All ethical standards that should govern research, as well as the 2013 Declaration of Helsinki, were complied with. The confidentiality and anonymity of the participants have always been assured. The Balearic Islands Research Ethics Committee (CEI-IB), which granted consent under number IB 483/20, approved the study.

Only the principal investigator knows who the participants are because all data are coded. Organic Law 3/2018, enacted on December 5, 2018, protects personal data and protects digital rights, allows and guarantees that study participants can access, rectify, cancel, and oppose the use of the collected data at any time.

Statistical analysis

Quantitative data were analyzed using Student's t test, calculating means and standard deviations. Prevalence was determined using the chi2 test for quantitative variables. Odds ratios with 95% confidence intervals were calculated and multinomial logistic regression analysis was used. SPSS 28.0 software was used to perform the statistical analysis. The accepted level of statistical significance for this study was $p<0.05$.

Results

Table I shows the anthropometric, clinical, analytical, sociodemographic, and healthy habits data of 386924 workers in the study. The mean age of the participants was just over 39 years. Except for LDL cholesterol, the rest of the variables have lower values in the group of women. Of the participants, 60.2% were men and 39.8% were women. The mean age of the population ranges between 30 and 49 years. Most of them have primary education and belong to socioeconomic class III. 45.5% of the men and 52.2% of the women regularly engage in physical activity, and 51.4% of the women and 41% of the men follow a Mediterranean diet. Thirty-seven percent of the men and 33% of the women were smokers.

Tables II a and **II b** present the means of the different type 2 diabetes risk scales analyzed in this study according to sociodemographic variables and healthy habits in both sexes. All the scales, in both men and women, increase their mean values as age increases and as socioeconomic and educational level decreases. All the scales show higher values in sedentary people, with low adherence to the Mediterranean diet and in smokers.

Table I: Characteristics of the population.

	Men n=232,814 Mean (SD)	Women n=154,110 Mean (SD)	p-value
Age (years)	39.8 (10.3)	39.2 (10.2)	<0.001
Height (cm)	173.9 (7.0)	161.2 (6.6)	<0.001
Weight (kg)	81.1 (13.9)	65.3 (13.2)	<0.001
Waist circumference (cm)	87.7 (9.1)	73.9 (7.9)	<0.001
Hip circumference (cm)	100.0 (8.4)	97.2 (8.9)	<0.001
Systolic blood pressure (mmHg)	124.4 (15.1)	114.4 (14.8)	<0.001
Diastolic blood pressure (mmHg)	75.4 (10.6)	69.7 (10.3)	<0.001
Total cholesterol (mg/dl)	195.9 (38.9)	193.6 (36.4)	<0.001
HDL-c (mg/dl)	51.0 (7.0)	53.7 (7.6)	<0.001
LDL-c (mg/dl)	120.5 (37.6)	122.3 (37.0)	<0.001
Triglycerides (mg/dl)	123.8 (88.0)	88.1 (46.2)	<0.001
Glycaemia (mg/dl)	88.1 (12.9)	84.1 (11.5)	<0.001
	%	%	p-value
20-29 years	17.9	19.5	<0.001
30-39 years	33.1	33.3	
40-49 years	29.7	29.4	
50-59 years	16.3	15.3	
60-69 years	3.0	2.5	
Primary school	61.2	51.8	<0.001
Secondary school	34.0	40.7	
University	4.8	7.5	
Social class I	5.3	7.2	<0.001
Social class II	17.4	33.2	
Social class III	77.3	59.8	
Non physical activity	54.5	47.8	<0.001
Yes physical activity	45.5	52.2	
Non healthy food	59.0	48.6	<0.001
Healthy food	41.0	51.4	
Non smokers	62.9	67.0	<0.001
Smokers	37.1	33.0	

HDL-c High density lipoprotein cholesterol. LDL Low density lipoprotein cholesterol

Table II a: Mean values of the type 2 diabetes risk scales according to sociodemographic variables and healthy habits in men.

		QD-Score RR	Finrisk	Canrisk	TRAQ-D	Oman
Men	n	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
20-29 years	25848	1.0 (1.9)	2.3 (3.2)	14.6 (6.1)	3.6 (2.2)	1.7 (2.2)
30-39 years	76960	1.2 (1.4)	3.5 (3.7)	16.3 (7.0)	5.0 (2.5)	2.4 (2.4)
40-49 years	69060	1.4 (1.4)	5.8 (4.3)	21.7 (8.8)	6.1 (2.7)	10.2 (2.8)
50-59 years	38028	1.5 (1.3)	8.3 (4.5)	30.0 (9.2)	8.3 (3.3)	11.0 (3.0)
60-69 years	7016	1.6 (1.2)	9.6 (4.5)	35.0 (8.9)	10.7 (2.9)	13.6 (3.0)
Primary school	131094	1.3 (1.6)	5.0 (4.5)	21.6 (9.7)	5.9 (3.2)	6.3 (5.1)
Secondary school	74980	1.2 (1.5)	4.8 (4.4)	18.7 (9.7)	5.6 (3.1)	6.3 (5.0)
University	10838	1.1 (1.3)	4.6 (4.3)	16.1 (9.2)	5.5 (3.1)	6.2 (4.9)
Social class I	11950	1.1 (1.3)	4.6 (4.4)	16.1 (9.2)	5.5 (3.1)	6.2 (4.9)
Social class II	38866	1.2 (1.4)	4.8 (4.4)	17.5 (9.5)	5.6 (3.1)	6.3 (5.0)
Social class III	166096	1.3 (1.6)	5.0 (4.5)	21.3 (9.7)	5.9 (3.1)	6.3 (5.1)
Non physical activity	122.912	1.9 (1.8)	7.9 (3.9)	25.7 (9.3)	6.9 (3.3)	8.4 (4.8)
Yes physical activity	94000	0.5 (0.3)	1.5 (2.0)	14.0 (5.7)	4.4 (2.3)	3.8 (4.1)
Non mediterranean diet	132672	1.8 (1.8)	7.4 (4.0)	24.9 (9.4)	6.8 (3.3)	8.1 (4.9)
Yes mediterranean diet	84240	0.5 (0.3)	1.4 (2.0)	13.8 (5.7)	4.4 (2.3)	3.7 (4.1)
Non smokers	137536	1.3 (1.4)	4.6 (4.4)	19.8 (9.3)	5.0 (2.9)	5.7 (5.0)
Smokers	79376	1.3 (1.7)	5.1 (4.5)	20.7 (10.0)	7.2 (3.0)	6.6 (5.1)

QD-Score RR Q-diabetes score relative risk. TRAQ-D Trinidad Risk Assesment Questionnaire.

Table II b: Mean values of the type 2 diabetes risk scales according to sociodemographic variables and healthy habits in women.

Women	n	QD-Score RR	Finrisk	Canrisk	TRAQ-D	Oman
		Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
20-29 years	19410	1.1 (2.5)	2.1 (3.2)	6.6 (6.2)	1.4 (2.4)	1.2 (2.2)
30-39 years	51392	1.2 (2.1)	2.6 (3.5)	7.3 (7.0)	2.4 (2.6)	1.5 (2.5)
40-49 years	45288	1.3 (1.7)	4.5 (4.1)	12.5 (8.7)	3.5 (2.7)	9.2 (2.9)
50-59 years	23514	1.5 (1.6)	7.4 (4.3)	21.3 (9.0)	5.6 (3.6)	10.3 (3.5)
60-69 years	3928	1.5 (1.3)	9.0 (4.3)	27.1 (8.4)	8.1 (3.2)	13.0 (3.6)
Primary school	73848	1.5 (2.1)	4.7 (4.5)	14.9 (9.6)	3.6 (3.4)	6.2 (5.2)
Secondary school	58690	1.1 (1.7)	3.3 (3.8)	7.9 (8.0)	2.7 (2.9)	4.5 (4.7)
University	10994	1.0 (1.8)	2.8 (3.7)	5.6 (7.4)	2.3 (2.7)	3.8 (4.41)
Social class I	10312	0.9 (1.7)	2.7 (3.6)	5.5 (7.3)	2.3 (2.6)	3.9 (4.4)
Social class II	48318	1.0 (1.6)	3.0 (3.7)	7.3 (7.6)	2.6 (2.8)	4.2 (4.6)
Social class III	84902	1.5 (2.1)	4.6 (4.4)	14.3 (9.6)	3.6 (3.4)	6.2 (5.2)
Non physical activity	70.370	2.2 (2.5)	7.2 (3.8)	17.6 (9.4)	4.4 (3.7)	7.8 (5.1)
Yes physical activity	73162	0.5 (0.3)	1.0 (1.5)	5.6 (5.0)	2.0 (2.0)	3.1 (3.8)
Non mediterranean diet	71418	2.1 (2.5)	7.0 (4.0)	17.3 (9.5)	4.3 (3.7)	7.6 (5.1)
Yes mediterranean diet	72114	0.5 (0.3)	1.1 (1.7)	5.7 (5.3)	2.0 (2.1)	3.2 (3.8)
Non smokers	96796	1.3 (1.8	3.5 (3.9)	10.4 (8.4)	2.4 (3.1)	4.8 (4.7)
Smokers	46736	1.3 (2.2)	4.2 (4.4)	11.8 (10.0)	4.6 (2.9)	5.6 (5.2)

QD-Score RR Q-diabetes score relative risk. TRAQ-D Trinidad Risk Assesment Questionnaire.

Tables III a and **III b** show the prevalence of elevated values of the type 2 diabetes risk scales by age, education, social class and healthy habits in men and women. We observed the same trend as with the mean values, i.e. higher prevalence at older age, lower socioeconomic and educational level, in sedentary people, with low adherence to the Mediterranean diet and smokers.

Table III a: Prevalence of high values of type 2 diabetes risk scales according to sociodemographic variables and healthy habits in men.

Men	n	QD-Score RR >3	Finrisk high	Canrisk	TRAQ-D
		%	%	%	%
20-29 years	25848	6.2	0.4	1.5	0.2
30-39 years	76960	7.4	1.1	2.7	1.2
40-49 years	69060	9.8	3.6	11.5	2.0
50-59 years	38028	12.0	8.5	32.8	8.1
60-69 years	7016	12.6	14.1	51.8	17.8
Primary school	131094	9.5	3.5	13.4	3.2
Secondary school	74980	7.8	3.0	8.9	2.6
University	10838	7.1	2.5	5.6	2.4
Social class I	11950	7.6	2.8	5.9	2.5
Social class II	38866	7.4	3.1	7.2	2.6
Social class III	166096	9.4	3.4	12.9	3.1
Non physical activity	122.912	15.8	6.1	20.4	5.2
Yes physical activity	94000	0.5	0.3	0.8	0.3
Non mediterranean diet	132672	14.6	6.4	18.9	4.8
Yes mediterranean diet	84240	0.6	0.3	0.8	0.3
Non smokers	137536	8.7	2.9	9.5	1.3
Smokers	79376	9.5	3.5	12.6	5.8

QD-Score RR Q-diabetes score relative risk. TRAQ-D Trinidad Risk Assesment Questionnaire.

Table III b: Prevalence of high values of type 2 diabetes risk scales according to sociodemographic variables and healthy habits in women.

Women	n	QD-Score RR >3	Finrisk high	Canrisk	TRAQ-D
		%	%	%	%
20-29 years	19410	8.3	0.3	0.1	0.5
30-39 years	51392	9.7	0.7	0.3	0.6
40-49 years	45288	11.2	2.6	3.1	0.8
50-59 years	23514	14.4	7.3	12.0	4.5
60-69 years	3928	14.6	12.8	22.4	9.4
Primary school	73848	13.7	3.3	5.4	2.0
Secondary school	58690	8.1	1.6	1.3	0.8
University	10994	6.3	1.5	0.9	0.6
Social class I	10312	6.1	1.6	0.8	0.5
Social class II	48318	7.2	1.5	1.0	0.8
Social class III	84902	13.4	3.2	5.1	1.8
Non physical activity	70.370	22.0	5.2	7.1	2.9
Yes physical activity	73162	0.3	0.2	0.2	0.1
Non mediterranean diet	71418	21.7	5.5	7.0	2.8
Yes mediterranean diet	72114	0.3	0.4	0.1	0.1
Non smokers	96796	10.2	1.7	1.84	1.3
Smokers	46736	11.2	2.9	4.2	1.5

QD-Score RR Q-diabetes score relative risk. TRAQ-D Trinidad Risk Assesment Questionnaire.

Table IV shows the results of the multivariate analysis using multinomial logistic regression. The variables that most increase the risk of presenting high values of the different type 2 diabetes risk scales are physical activity, Mediterranean diet and age.

Table IV: Multinomial logistic regression.

	QD-Score >3 OR (95% CI)	Finrisk high OR (95% CI)	Canadian high OR (95% CI)	TRAQ-D high OR (95% CI)
Female	1	1	1	1
Male	0.59 (0.58-0.61)	1.12 (1.08-1.17)	4.20 (4.06-4.34)	1.75 (1.67-1.85)
20-29 years	1	1	1	1
30-39 years	1.16 (1.10-1.21)	1.71 (1.60-1.82)	2.38 (2.27-2.50)	3.20 (3.00-3.42)
40-49 years	1.17 (1.10-1.22)	3.73 (3.49-3.98)	8.59 (8.17-9.04)	13.95 (12.94-15.03)
50-59 years	1.26 (1.21-1.31)	9.77 (9.01-10.59)	35.02 (32.90-37.27)	20.06 (18.46-21.81)
60-69 years	1.35 (1.30-1.40)	17.98 (15.67-20.63)	44.30 (40.50-48.45)	42.95 (37.16-49.64)
Social class I	1	1	1	1
Social class II	1.30 (1.23-1.38)	1.06 (1.04-1.10)	1.85 (1.76-1.95)	1.04 (1.02-1.07)
Social class III	1.31 (1.26-1.37)	1.12 (1.02-1.22)	2.99 (2.76-3.24)	1.15 (1.12-1.19)
Yes physical activity	1	1	1	1
Non physical activity	53.33 (44.01-64.63)	68.32 (41.43-112.65)	8.05 (7.34-8.84)	7.21 (6.16-8.45)
Yes mediterranean diet	1	1	1	1
Non mediterranean diet	23.87 (19.81-28.76)	30.99 (18.78-51.13)	4.25 (3.84-4.71)	2.78 (2.37-3.27)
Non smokers	1	1	1	1
Smokers	1.09 (1.06-1.12)	1.08 (1.04-1.11)	1.22 (1.20-1.25)	4.49 (4.28-4.70)

QD-Score RR Q-diabetes score relative risk. TRAQ-D Trinidad Risk Assesment Questionnaire.

Discussion

In our study, sex, age, social class, level of physical activity, adherence to the Mediterranean diet and tobacco consumption influence the values of the type 2 diabetes risk scales analyzed.

In a systematic review assessing the influence of gender on the prevalence of type 2 diabetes, the authors found that there was a difference in prevalence between men and women, with a higher prevalence in men, linked to sex and not to gender[30]. Another study showed that sex is considered a very important factor that plays a fundamental role in regulating homeostasis and has a greater impact on cardiometabolic risk factors, as well as on the clinical presentation and management of DM[31].

According to data from the National Institute of Diabetes and Digestive and Kidney diseases (NIH), type 2 diabetes can occur in people at any age, including childhood. However, it is found preferentially in middle-aged and older people, especially from 45 years of age onwards[32]. A Spanish systematic review assessed the prevalence of type 2 diabetes in different age groups and found a higher prevalence at older ages[33]. Both studies reinforce the results found in our study.

In our study, the risk of presenting elevated values of the type 2 diabetes risk scales is higher in people with a low socioeconomic level (social class III and primary education); these data are in accordance with those found in several systematic reviews[34,35].

People with low levels of physical activity, or sedentary people, show higher values in all the type 2 diabetes risk scales in our study. A meta-analysis[36] that included 81 studies also found this association, between sedentarism and a higher prevalence of type 2 diabetes compared to people with moderate physical activity, and these, a higher prevalence than persons with high levels of physical activity. Other researchers found similar results[37-39].

We have found that persons with high adherence to the Mediterranean diet have lower values on the type 2 diabetes risk scales. A Spanish study[40] expresses itself in similar terms. A study[41] comparing the effects of two types of diet, ketogenic and Mediterranean, on diabetes concluded that both were effective, although the Mediterranean diet had some advantages.

Tobacco consumption increases the risk of presenting high values of the type 2 diabetes risk scales, especially if we apply the TRAQ-D criteria; our obtained data obtained are similar to those observed in other studies[42,43].

Strengths and limitations

As strengths, we would especially highlight the large size sample size, which gives the results great power, and the greatl number of type 2 diabetes risk scales analyzed.

The main limitation is that the study was conducted in the working population, which excludes people under 18 years of age or over 69 years of age, so that the results may not be extrapolated to the general population. In addition, some of the scales are designed for populations different from the Spanish population.

Conclusions

The variables that most increase the risk of presenting high values in the type 2 diabetes risk scales are low level of physical activity, low adherence to the Mediterranean diet and advanced age.

The prototype of a person at high risk of presenting type 2 diabetes would be a male (except for Q-diabetes), of advanced age, low socioeconomic level, sedentary, with low consumption of Mediterranean diet and smoker.

Conflict of Interest

The authors declare that there is no conflict of interest.

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