Clinical-Epidemiological Characteristics of Type 2 Diabetic Patients Treated at the Community Hospital

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Abstract

Introduction: Diabetes mellitus is a significant public health problem worldwide; despite scientific and technical advances, underreporting of the incidence and prevalence rate is reported; which hinders early diagnosis, timely treatment, rehabilitation and prevention of complications.

Objectives: To characterize from a clinical-epidemiological point of view type 2 diabetic patients treated at the Tlaxco Community Hospital.

Methods: A descriptive and retrospective investigation was carried out in 60 patients diagnosed with type 2 diabetes mellitus treated in the Internal Medicine outpatient clinic of the Tlaxco Community Hospital, in the period of time from May 2, 2024 to November 30 of the same year.

Results: 60 % of the patients belonged to the age group between 41-60 years. There was a clear predominance of the female sex (65%). Light physical activity prevailed in 61% of the patients and obesity in 63% of those studied; the most commonly observed personal pathological antecedents were arterial hypertension in 70% of the studied and chronic kidney disease in 48.3%. Altered total cholesterol was observed in 70% of patients, followed by an increase in LDL cholesterol in 68.3% and HbA1c in 65%; high pulse pressure prevailed in 70% of patients, mainly in the ages between 41-60 years (42%).

Conclusions: It was found that women under 60 years of age predominated in the research, related to the increased prevalence of high blood pressure, obesity, light physical activity and other transcendental risk factors such as dyslipidemia, hyperuricemia and increased pulse pressure that identify predictive parameters of cardiovascular morbidity and mortality and reveal hidden morbidity of metabolic syndrome in the patients investigated.

Key words: type 2 diabetes mellitus; arterial hypertension; chronic kidney disease; dyslipidemia; pulse pressure

Introduction

Diabetes mellitus is considered a major global health problem given its high and increasing incidence, prevalence, and mortality rates. It is one of the priorities of chronic non-communicable diseases demanding the attention of world leaders due to the significant increase in the number of cases in recent decades1. The disease constitutes a multifactorial clinical-humoral syndrome, characterized by chronic hyperglycemia and disorders in carbohydrate, lipid, and protein metabolism, due to an absolute or relative deficiency in insulin secretion or insulin resistance.[1,2]

It is currently considered a chronic degenerative disease with a high impact on the quality of life of the global population, considering that it causes physical disability due to its various multi-organ complications, with an undeniable increase in morbidity and mortality in recent years, regardless of the social, cultural, and economic circumstances of the countries. According to the International Diabetes Federation, in 2021 there were approximately 537 million people between the ages of 20 and 79 worldwide with this

condition, and it was estimated that 1 in 10 adults suffered from it at that time (73.6 million more adults with diabetes than in 2019). It is presumed that diabetes caused 2.5 million more deaths than in 2019.[2, 3].

By 2030, the IDF estimates that one in nine adults will have diabetes (643 million), and by 2045 the estimated number is 783 million (one in eight adults), representing a 46% increase in affected patients. Diabetes-related health expenditures are estimated to reach $1.1 trillion.

The global prevalence has doubled since 1980, rising from 4.7 to 8.7 per 100 inhabitants in the adult population. It represents the ninth leading cause of death worldwide and is projected to be the seventh by 2030.[3]

In the Americas, in 2019, diabetes was the sixth leading cause of death, with an estimated 244,084 directly caused deaths. It is the second leading cause of disability-adjusted life years (DALYs), reflecting the life-limiting

complications experienced by people with diabetes throughout their lives. [4]

In southern and central Latin America, including Cuba, the number of adults with diabetes mellitus in 2021 was potentially 32 million. It is estimated that this number will increase by 50% by 2045, reaching approximately 49 million in that region; however, one of them will die from this cause every 6 seconds.[4.5]

Mexico is no exception. It is subsequently reported that during the first quarter of 2024, a total of 11,083 admissions of patients diagnosed with Type 2 Diabetes Mellitus (T2DM) were registered in the system, with the states of Tabasco, Jalisco, and Mexico City reporting the highest number.

It is important to note that the prevalence of diabetes in Mexico has increased substantially in recent decades: in 1993, the prevalence of diabetics with a known diagnosis in the population over 20 years of age was 4.0%, while in 2000 and 2007, a prevalence of 5.8% and 7%, respectively, was reported. Furthermore, according to national surveys from those same years, a high prevalence of comorbid conditions and a higher incidence of macrovascular and microvascular complications have been demonstrated in the diabetic population[.6,7,8]

 The above places Mexico as the fourth country in the world with the highest burden of disease associated with type 2 diabetes and belongs to the group of countries with a high number of people living with this condition. A study published in 2019 showed that, at the national level, between 1990 and 2017, there was an increase in the total burden of type 2 diabetes in the Mexican population (especially among men); at the state level, the most pronounced increases occurred in the country's poorest states.[7,8]

Therefore, It has been suggested that the disproportionate and unequal burden of type 2 diabetes in Mexico is the result of the confluence of factors such as genetic predisposition, the high prevalence of risk factors and comorbidities, in addition to the coverage of health services, which reflects serious limitations for early detection and adequate control of the disease 8. Therefore, we feel motivated and carry out this research to characterize the clinical-epidemiological generalities of type 2 diabetic patients treated at the Tlaxco Community Hospital.

Material and Methods

A descriptive and retrospective study was conducted in 60 patients diagnosed with type 2 diabetes mellitus who attended the Internal Medicine outpatient clinic of the Tlaxco Community Hospital from May 2, 2024, to November 30, 2024.

The following inclusion criteria were considered for selection of the study group: living patients, age over 18 and under 65 years, both sexes, accurate time since onset of personal medical history, and assessment of the selected variables at the different patient consultations, which facilitated documentary review.

The following variables were operationalized: age, sex, physical activity, pulse pressure, body mass index, time since onset of the disease, in addition to personal medical history, and monitoring of clinical laboratory parameters supported by complementary tests that determined biochemical variables.

These were evidenced in the clinical records of the subjects studied. Diagnostic criteria for diabetes were applied based on glycated hemoglobin (HbA1c) ≥6.5%. Fasting glucose ≥126 mg/dL (fasting for at least 8 hours). Two-hour plasma glucose ≥200 mg/dL after an oral glucose tolerance test (based on the technique described by the WHO, using a 75 g anhydrous glucose load dissolved in water).

Symptoms of hyperglycemia and blood glucose levels greater than or equal to 200 mg/dL at any time of day were assessed. Uric acid, total cholesterol, low-density lipoprotein (LDL), high-density lipoprotein (HDL), and triglycerides were also determined to identify the presence of hyperuricemia and dyslipidemia.

Glycosylated hemoglobin was also determined, taking into account the laboratory's standardized values. The type of physical activity the patient performed, including occupation and level of sedentary lifestyle, were taken into account during the study.

Body mass index (BMI) was calculated using the 1998 WHO criteria: normal weight: BMI between 18.5 and 24.9; Overweight: BMI between 25 and 29.9; and obese: BMI ≥30. Pulse pressure, expressed in mmHg, was calculated and considered an indicator of arterial compliance.

 The research was conducted through a documentary review of the hospital's clinical records. Finally, to perform the statistical analysis, an EPINFO 6 database was processed using bivariate analysis. This allowed for the calculation of percentages and the application of the test of independence using the Standard Normal Test for comparing proportions.

This allowed for the validation of the research results and their presentation using tables and graphs.

Results

Table 1 ; models the data taking into account the age and sex of the patients who were the subject of the study, with women predominating, with a total of 39 patients for 65%. The age group that stood out in this study was the 41-60 age group with 36 patients for 60%, with women accounting for 42%.

Age (years)	Sex					
	Female		Male		Total	
	No.	%	No.	%	No.	%
Under 20	1	2,0	0	0	1	2,0
20-40	2	3,0	3	5,0	5	8,0
41-60	25	42,0	11	18,0	36	60,0
61 and over	11	18,0	7	12,0	18	30,0
Total	39	65,0	21	35,0	60	100

Table 1: Type 2 Diabetic Patients Treated at the Tlaxco Community Hospital

By age and sex from May 2, 2024, to November 30, 2024

Patients according to their personal medical history and duration of disease are shown in Table 2. High blood pressure was the most common in 70% of the patients studied, with a duration of more than 11 years, followed by chronic kidney disease and ischemic heart disease in 48.3% and 25%, respectively.

	Evolution time (years)						Total	
	1-5		6-10		11 y más			
	No.	%	No.	%	No.	%	No.	%
High Blood Pressure	8	13,3	13	21,66	21	35	42	70
Chronic Kidney Disease	10	16,6	19	31,66	0	0,0	29	48,3
Ischemic Heart Disease	5	8,0	10	16,6	0	0,0	15	25,0
Other	5	8,0	8	13,3	0	0,0	13	21,6

Table 2: Type 2 diabetic patients treated at the Tlaxco Community Hospital according to their personal medical history and duration of disease.

Source: Medical Records

Table 3 shows the relationship between the body mass index (BMI) of the patients studied and their physical activity. It is observed that 38 patients, or 63%, were obese, this parameter being the most significant. Of these, 23 (38%) engaged in light physical activity. It is revealed that 17 patients, or 20%, were classified as overweight, and the lowest percentage of patients were of normal weight. It is important to note that 61% of the total number of patients studied led a sedentary lifestyle.

Physical Activity	Body Mass Index						Total	
	Obese		Overweight		Normal Weight			
	No.	%	No.	%	No.	%	No.	%
Light	23	38,0	11	18,0	3	5,0	37	61,0
Moderate	15	25,0	5	8,0	2	3,0	22	37,0
Severe	0	0,0	1	2,0	0	0,0	1	2,0
Total	38	63,0	17	28,0	5	8,0	60	100

Table 3: Distribution of type 2 diabetic patients treated at the Tlaxco Community Hospital according to physical activity and BMI.

Source: Medical Records

Table 4: shows the patients according to laboratory parameter control, with elevated total cholesterol predominating in 70% of patients, followed by elevated LDL cholesterol in 68.3% and HbA1c in 65% of those studied.

Laboratory Parameters	Normal		Altered	
	N^0		%	
	21	35,0	N^0	%
HbA1c	26	43,3	39	65,0
Fasting Blood Glucose	26	4,3	34	56,7
Triglycerides	25	41,7	34	56,7
HDL Cholesterol	18	30,0	35	58.3
Total Cholesterol	19	31,7	42	70,0
LDL Cholesterol	25	41,7	41	68,3
Uric Acid				

Table 4: Patients according to laboratory parameters control

Source: Medical Records

Table 5 . highlights the predominance of patients with elevated pulse pressure (70%), with the 41-60 age group being the most prevalent. This was followed by the 61 and older age group at 23%

Age (years)	Pulse pressure				Total	
	Normal		Elevated			
	No.	%	No.	%	No.	%
Under 20	1	2,0	0	0,0	1	2,0
20-40	2	3,0	3	5,0	5	8,0
41-60	11	18,0	25	42,0	36	60,0
61 and over	4	7,0	14	23,0	18	30,0
Total	18	30,0	42	70,0	60	100

Table 5: Patients by age and pulse pressure.

Source: Medical Records

Discussion

Type 2 diabetes mellitus is considered a risk factor for cardiovascular disease, which varies from country to country and increases with aging. Mexico is the fourth country in the world with the highest burden of disease associated with type 2 diabetes and belongs to the group of countries with the highest number of people living with this condition.[8]

Considering the results of the epidemiological data based on the sex and age of the patients studied, differences were observed between both sexes, with a predominance of women, and the age group between 41 and 60 years. A descriptive study in Mexico confirmed that in 2021, the incidence rate of type 2 diabetes mellitus increased only in the population under 55 years of age, with a notable increase in women aged 20 to 49, which is consistent with the results of this study.[5,6]

In addition, a study published in 2019 showed that, nationwide, between 1990 and 2017, there was an increase in the total burden of type 2 diabetes mellitus in the Mexican population (especially in men); this is inconsistent with the results of this study.7 The authors of this research believe that the inclusion criteria for selecting the sample directly influenced these results.

However, in this country, it has been shown that the disproportionate and unequal burden of the disease is the result of a combination of factors such as genetic predisposition, the high prevalence of risk factors, comorbidities, and limitations in early detection and adequate control of the disease. Other studies showed that 48.19% (n=5,341) of cases were male and 51.81% (n=5,742) were female. The age group affected was 60 to 64 years for women and 55 to 59 years for men. [8,9,10]

It is important to highlight the loss of estrogen, which constitutes a vascular protector, in women, given the predominant age range that coincides with the menopause process in this sex.

Several international studies have demonstrated the prevalence in women, especially those over 45 years of age. Chile, however, reported a prevalence of type 2 diabetes mellitus of 23%, with no differences by sex. [9,10]

The personal medical history explores the patient's previous medical conditions, leading to the identification of possible risk factors, disease patterns, and potential complications. In this study, chronic diseases typify the results. The authors of this study assessed the highly prevalent vascular risk presented by the patients studied in relation to their medical history.

High blood pressure, with a history of more than 11 years, prevailed in this study, followed by chronic kidney disease and ischemic heart disease. [11,12]

A study conducted in Mexico revealed that high blood pressure was the most frequently reported comorbidity in cases of type 2 diabetes mellitus (6,705 cases, 60.50%); followed by obesity, present in 1,488 cases (13.43%), and chronic kidney disease (1,433 cases, 12.93%). This is consistent with the results of this study. [7,8]

The authors of this study acknowledge that in patients with type 2 diabetes, hypertension may be present at the time of diagnosis or even before it develops and is often associated with obesity. This increases the risk and accelerates the course of heart disease, peripheral vascular disease, stroke, retinopathy, and nephropathy.

Some studies conducted in Spain have corroborated the presence of obesity. The coexistence of other risk factors such as hypertension and dyslipidemia in patients with type 2 diabetes.[14]

The increase in sedentary lifestyle and obesity in an aging world population has led to the rising incidence and prevalence of type 2 diabetes mellitus globally.

Physical activity improves heart health, increases metabolism, aids weight loss, lowers blood pressure, and increases HDL cholesterol, thus benefiting patients with prediabetes and diabetes. In addition to reducing blood glucose, it increases the body's ability to use it as an energy source (increasing insulin sensitivity).[13,14]

This study shows the high incidence of obese patients, this parameter being the most significant, with light physical activity, followed in order of frequency by overweight. It is striking that 61% of the total number of those studied led a sedentary lifestyle.[15]

Studies conducted in Mexico in 2019 showed that 15.96% of type 2 diabetic patients studied reported engaging in physical activity for at least 30 minutes daily (5.43%). The median weight in women was 67 kg and in men, 74 kg. Regarding BMI, 65.34% of cases were overweight or obese. These results coincide with those of this research.[7,8,9]

Another study in Spain highlighted the predominance of patients with central visceral obesity, in men more than in women, although this varies with age, where abdominal circumference in women begins to increase considerably due to hormonal changes.[11]

It is estimated that the risk of developing ischemic vascular disease is 10 times higher in men than in women before the age of 55 (menopausal age), when they lose the vascular protection conferred by estrogen.

The authors acknowledge that the prevalence of Metabolic Syndrome is increasing worldwide. According to the World Health Organization, the number of overweight and obese individuals exceeds 1.5 billion people. Approximately 80% of heart disease, cerebrovascular disease, Type 2

Diabetes Mellitus, and between 7% and 40% of cancers could be prevented with a healthy diet and adequate physical activity. [11,16]

An analysis of the relationship between the nutritional status of patients diagnosed with Diabetes and their physical activity has identified obesity as a potential risk factor for the development of Metabolic Syndrome. This, combined with inadequate lifestyles such as limited physical activity, contributes to the deterioration of the vascular wall and, consequently, the onset of complications.

In this study, the high incidence of obese and overweight patients, combined with limited physical activity, was associated with intra-abdominal adiposity, exacerbating these risk factors, including increased free fatty acids, which overload the liver and muscles, thus increasing insulin resistance. Similar results were obtained in studies conducted in Mexico. It is worth noting that increased physical activity and exercise reduce cardiovascular risk factors by improving insulin sensitivity. [11,12,16]

Therefore, among its beneficial actions are increased high-density lipoprotein (HDL) cholesterol, decreased very-low-density lipoprotein (VLDL) cholesterol, and, in some cases, low-density lipoprotein (LDL) cholesterol, as well as lower blood pressure. Furthermore, weight loss attenuates risk factors and reduces the patient's overall risk. The effect of healthy diets is additive to exercise, therefore, mixed diet and exercise programs are recommended to treat these disorders[16]

Other research postulates that chronic diseases reach epidemic proportions and contribute substantially to overall mortality from cardiovascular diseases; Among these, ischemic heart disease and cerebrovascular diseases increasingly affect working-age populations in several countries and contribute disproportionately to the loss of potential years of healthy life and economic productivity. [16,17]

Furthermore, the association between obesity (body mass index [BMI], waist circumference) and the presence of type 2 diabetes mellitus has been widely studied, and it is recognized that they increase cardiovascular risk.

Spain reported strict control of risk factors associated with type 2 diabetes mellitus by sex and age groups. Likewise, the impact of this control on cholesterol levels, glycosylated hemoglobin, and decreased blood pressure has been studied. [14,16]

There is extensive scientific literature focused on type 2 diabetes mellitus, and several studies have shown an increase in cardiovascular risk, which also increases with the increase in the number of risk factors, such that individuals with more than four risk factors have a five-fold increase in cardiovascular risk. increased risk of developing cardiovascular disease.[14,16,17]

The great significance of type 2 diabetes mellitus lies in the fact that those who suffer from it are at increased risk of developing vascular disease, with a consequent increase in mortality from these factors. The presence of multiple risk factors in the same patient further increases the multiplicative risk, making monitoring laboratory parameters vitally important in the patients studied. A study conducted in Spain showed that elevated parameters such as fasting and postprandial blood glucose, glycosylated hemoglobin, dyslipidemia, and other biomarkers were significantly related to the prevalence of a high risk of cardiovascular disease.[14,17,18]

Recently, it has been shown that all the factors associated with each component exceed the impact of standard risk factors added together individually, since these factors comprise the Metabolic Syndrome and rarely occur separately. It has been proven how difficult it is to isolate the contribution of each one. of them to the overall risk. This added risk is due, in part, to non-classical factors whose influence has not been classified and the pathophysiological mechanisms are still unknown.[18]

Recent studies have revealed that the medical world has been struggling for several decades to control the atherogenic process. This is not due to a single cause, but rather multiple factors. Macrovascular complications are 10 times more frequent than severe microvascular complications and occur more frequently in patients with glucometabolic disorders, even before the onset of diabetes, as do alterations in kidney function.[19]

Observational studies, such as the Framingham study, have shown that pulse pressure (PP) increases with age, in both men and women, in parallel with the increase in systolic blood pressure (SBP), especially in the population over 60 years of age.

Pulse pressure is defined as the difference between SBP and diastolic blood pressure (DBP) and is considered an indicator of arterial compliance. From a pathophysiological perspective, it is linked to aging, and its increase with age is often a response to the progressive hardening of the main arteries.

Although it is currently not possible to definitively define normal pulse pressure values, various population studies have shown that pulse pressure levels above 55-65 mmHg are associated with increased cardiovascular morbidity and mortality and constitute an independent marker of cardiovascular risk. [18,19].

Type 2 diabetes mellitus is also one of the most frequent reasons for consultation in primary and secondary care. However, hypertensive patients with this condition exponentially increase their risk of developing cardiovascular disease. The incidence of hypertension, type 2 diabetes mellitus, and pulse pressure increase with age and promote atherogenesis.

In this regard, the importance of hypertension and type 2 diabetes mellitus in the development of cerebrovascular disease is well known, and pulse pressure research using various methods is a current topic of debate. Other studies have reported similar results and have shown that elevated pulse pressure is a marker of cardiovascular events in both normotensive and hypertensive populations.

Currently, various population studies have shown that a pulse pressure above 60 mmHg is associated with increased cardiovascular morbidity and mortality, constituting an independent marker of cardiovascular risk. [18,19,20].

Conclusions

The predominance of type 2 diabetes mellitus in female patients under 60 years of age was evident, related to the increased prevalence of high blood pressure, obesity, sedentary lifestyle, and other key risk factors such as dyslipidemia, hyperuricemia, and elevated pulse pressure. These factors identify predictors of cardiovascular morbidity and mortality and reveal hidden morbidity from metabolic syndrome in the patients studied.

The authors declare no conflicts of interest.

Authors Contribution

Josefa Bell Castillo. Conception of the idea and preparation of the article. Data collection as well as analysis and interpretation. Contribution with the design, Search and review of bibliography; review and approval of the final version of the manuscript.

Ruksandra Sucel Sarmiento Ramirez.Data collection as well as analysis and interpretation. Contribution with the analysis and interpretation of the data; Search and review of bibliography.

Lizbeth Monserrat Ramírez Cruz. Data collection as well as analysis and interpretation. Contribution with the analysis and interpretation of the data; Search and review of bibliography.

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