ISRG Journal of Arts, Humanities and Social Sciences (ISRGJAHSS)

ISRG PUBLISHERS
Abbreviated Key Title: ISRG J Arts Humanit Soc Sci
ISSN: 2583-7672 (Online)
Journal homepage: https://isrgpublishers.com/isrgjahss
Volume – III Issue-I (January- February) 2025
Frequency: Bimonthly

Cardiovascular Risk in Elderly T2DM Patients

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| **Received:** 28.01.2025 | **Accepted:** 29.01.2025 | **Published:** 02.02.2025

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Abstract

Background: *The prevalence and incidence of diabetes increase with age. Mostly encountered among adults aged 65 years and older. Individuals with diabetes are at higher risk for cardiovascular disease, and age strongly predicts cardiovascular complications. The aimed study was to evaluate the prevalence of diabetes mellitus and to assess its impact on the risk of cardiovascular diseases for the elderly over 65 years old.*

Methods: *We performed a cross-section descriptive study of the elderly (aged ≥65 years) from January to December 2019 by using the National Health Information Database. The software SPSS 20.0 version was used for data analyses. A p-value less than 0.05 was considered statistically significant.*

Results: *This study included 1245 patients with T2DM, (46% female and 54% male), with an average age of 71.2 ±8.5. About 43.8% of patients were obese, and the T2DM duration was 12.9 ± 2.4years. Regarding CVD, most of them resulted in hypertension at 59%, MI at 12%, atherosclerosis at 15.1%, coronary heart disease at 21.2%, 1.9% heart failure, angina at 6.4%, and 7.6% stroke.*

Conclusion: *The prevalence of CVD among our T2DM patients resulted relatively significant. Hypertension, coronary heart disease, and IM were the major contributors to CVD. We recommend more attention to the management of diabetes to reduce the risk of cardiovascular disease, in late life, in the geriatric population.*

Keywords: *Diabetes mellitus, cardiovascular diseases, geriatric population*

DOI: 10.5281/zenodo.14788905

Introduction

Type 2 diabetes mellitus (T2DM) is a progressive and chronic metabolic disorder that is characterized by insulin resistance and functional failure of pancreatic beta cells (1). Over the past few decades, the T2DM prevalence has been increasing intensely. The highest rates of growth are seen in old age, mostly encountered among adults aged 65 years and older (2-4). Conceptually, the term "elderly" usually describes a person aged 65 years or more (5)], though there are studies that describe "young elderly" as the population between 60–69 years old and as "old elderly" the persons aged 70–80 years old (6).

Patients who suffer from diabetes are at higher risk for cardiovascular disease, and age strongly predicts cardiovascular complications. On the other hand, cardiovascular disease is the main cause of complications and morbidity among patients with T2DM globally (7, 8). Many studies have estimated a 2- to 4-fold higher risk of CVD among T2DM patients in contrast with a non-diabetic population (9-11). Furthermore, the American Heart Association on Heart Disease and Stroke Statistics in the 2019 update, reported that the incidence of cardiovascular diseases among patients aged 40 to 60 years was on average 35–40%, in patients aged 60 to 80 years 75–78%, while in patients over 80 years of age the incidence it was over than 85% (12).

Additionally, it also reports a significant difference between genders regarding the incidence of cardiovascular diseases, most likely due to the influence of sex hormones and an increase in metabolic syndrome prevalence in women [13,14]. The aimed study was to evaluate the prevalence of diabetes mellitus and to assess its impact on the risk of cardiovascular diseases for the elderly over 65 years old.

Methods

Study Participants**:** We performed a cross-section descriptive study of the elderly (aged ≥65 years) from January to December 2019 by using the National Health Information Database. Data used in one year of analysis contains sociodemographic and comorbidities information for the entire study population. The National Health System provides, through the national health screening program and regular health checkups aged >40 years. Approval for the study protocol was obtained from the institutional review board. The need for informed consent was waived by the board. Patients with type 2 diabetes were identified from the visits to the Medical Health Center. The inclusion criteria were all patients who have at least 1 claim per year for the prescription of antidiabetic medication under the International Classification of Diseases, Tenth Revision (ICD-10) diagnostic codes, and having fasting plasma glucose of >120mg/dL. For each patient was evaluated for the cardiovascular event and cardiovascular diseases defined as an ICD-10 code. All participants completed a questionnaire on sociodemographic data, smoking, alcohol, physical habits, Body Mass Index (IBM) comorbidities, and medical history.

Statistical analysis: The software SPSS 20.0 version was used for data analyses. Descriptive statistics were used to analyze the baseline characteristics of the study population. The data are presented as mean ± SD, frequency, and percentage. The ANOVA test was used to compare continuous variables whereas categorical variables were compared using the MantelHaenszel $\chi 2$ test. A p-value less than 0.05 was considered statistically significant.

Results

Table 1 shows the baseline characteristics of the patient's participation in this study. This study included 1245 patients with T2DM, and the T2DM duration was approximately 12.9 ± 2.4years. Males presented the most predominant gender 54% compared to females 46%. The average age of patients resulted in 71.2 ±8.5, and patients in the age groups 70-80 years old presented a higher number compared to other age groups. Most of the patients live in urban areas 83.2%. Regarding the habits of patients, 19% were common alcohol users, 33.1% were tobacco users, and only 17.7% have daily physical activity. Most of the patients resulted in a normal weight of 47.9%. underweight 8.3% and about 43.8% of patients were obese (overweight 21.9%, obese class I 12%, and obese class II and III 9.9%).

Related to the family history for diabetes mellitus tip 2, only 33.25% of patients resulted with family history. About 71.5% of patients resulted with comorbidities and the most and the most common was hypertension 59.6%. Furthermore, 64.2% of patients resulted with cardiovascular diseases and 35.8% were without.

Table 1. Baseline characteristics of T2DM patients

Variables		Frequency	Percentage
Gender	Male	672	54%
	Female	573	46%
Age groups	≥65-69 years old	364	29.25%
	70-80 years old	741	59.5%
	>80 years old	140	11. 25%
Residence area	Rural	209	16.8%
	Urban	1036	83.2%
Alcohol use	No	1009	81%
	Yes	236	19%
Smoking use	No	833	66.9%
	Yes	412	33.1%
BMI	underweight (BMI: ≤18.4kg/ m2)	103	8.3%

DOI: 10.5281/zenodo.14788905

	normal weight (BMI: 18.5–24.9kg/m2)	596	47.9%
	overweight (BMI: 25.0–29.9kg/m2)	273	21.9%
	obese class I (BMI: 30.0– 34.9kg/m2)	150	12%
	obese class II–III (BMI: ≥35.0kg/m2)	123	9.9%
Physical activity	No	1025	82.3%
	Yes	220	17.7%
Family history	No	831	66.75%
	Yes	414	33.25%
Comorbidities	No	355	28.5%
	Yes	890	71.5%
Hypertension	No	502	40.3%
	Yes	743	59.6%
Cardiovascular Diseases	No	446	35.8%
	Yes	799	64.2%

Additionally, 12% were diagnose with myocardial infarction (MI), atherosclerosis 15.1%, coronary heart disease 21.2%, 1.9% heart failure, angina 6.4%, and 7.6% stroke. Figure 1 shows the percentage of cardiovascular diseases.

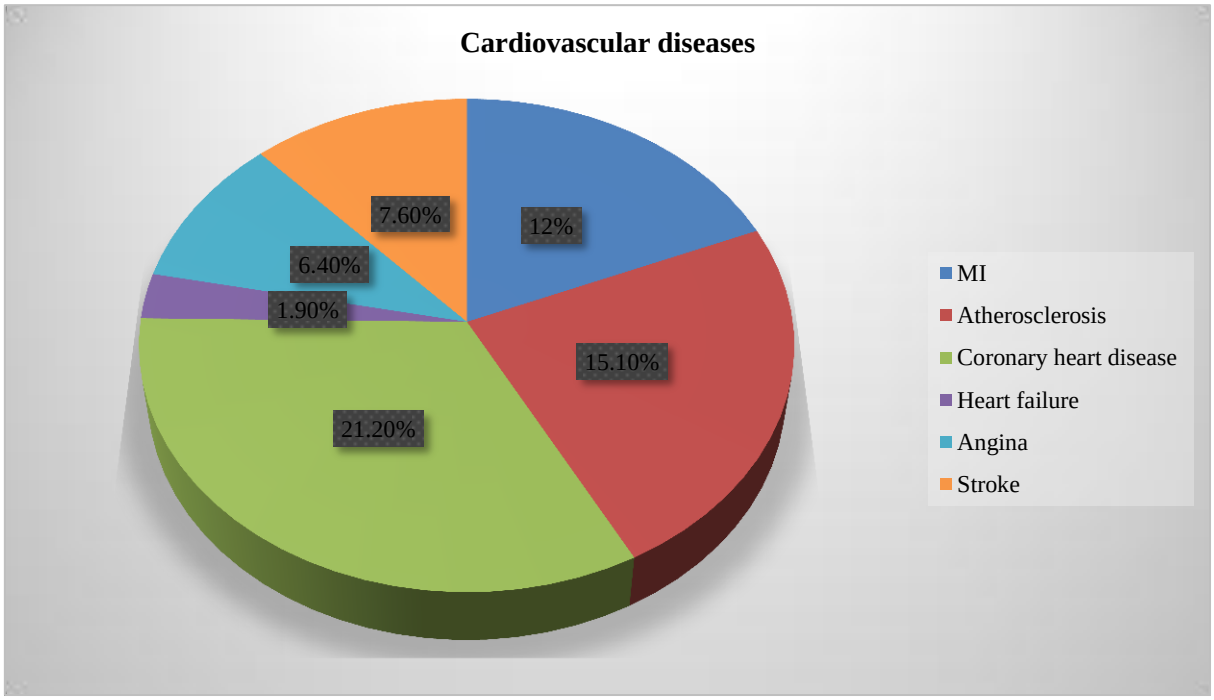

Figure 1. distribution of cardiovascular diseases

Table 2 shows the regression logistic of some of the risk factors for cardiovascular diseases of the patient's participation in this study. We have analyzed the risk factors such as gender, age groups, residence, habits, BMI, family history, and comorbidities among T2DM patients, to assess its impact on the risk of cardiovascular diseases for the elderly over 65 years old. Except for the residence area, for all risk factors that we have analyzed the p-value resulted in a significant <0.05.

Table 2. Logistic regression analysis data

Variables		CVD	Odds Ratio	P value
		Yes		
Gender	Male	477	1.72 [1.29-2.84	0.03
	Female	322	1 reference	
Age groups	≥65-69 years old	191	1 reference	

DOI: 10.5281/zenodo.14788905

	70-80 years old	502	1.34 [0.98-2.61]	0.04
	>80 years old	106	1.9 [1.01-3.4]	0.002
Residence area	Rural	95	0.8 [0.43-1.5]	0.6
	Urban	704	1 reference	
Alcohol use	No	626	1 reference	
	Yes	173	2.3 [1.91-3.87]	0.001
Smoking use	No	520	1 reference	
	Yes	279	1.7 [1.15-2.46]	0.03
BMI	underweight (BMI: ≤18.4kg/ m2)	48	0.9 [0.01-1.58]	0.7
	normal weight (BMI: 18.5–24.9kg/m2)	332	1 reference	
	overweight (BMI: 25.0–29.9kg/m2)	213	1.5 [1.27-2.38]	0.037
	obese class I (BMI: 30.0– 34.9kg/m2)	118	2.7 [1.57-4.98]	0.0001
	obese class II–III (BMI: ≥35.0kg/m2)	88	3.8 [2.023-5.64]	<0.0001
Physical activity	No	692	1 reference	
	Yes	107	1.1 [0.5-1.8]	0.047
Family history	No	514	1 reference	
	Yes	285	2.4 [1.8-4.3]	0.008
Comorbidities	No	274	1 reference	
	Yes	525	1.8 [1.17-2.82]	0.009

Discussion

Type 2 Diabetes Mellitus (T2DM) is the most common form, with approximately 90% of patients diagnosed with diabetes having type 2, and over 95% of them being over 60 years old (14). In 2020, the World Health Organization (WHO) reported an impressive increase in the incidence of diabetes: the number of patients diagnosed with this disease is 422 million, and in 2045 will exceed 692 million (15.16). Cardiovascular diseases in patients diagnosed with diabetes can materialize either in the form of hypertension, coronary heart disease (CHD), myocardial infarction (MI), atherosclerosis, heart failure, angina, stroke, deep vein thrombosis, and pulmonary embolism (17,18).

In this study, the prevalence of hypertension among our patients resulted in 59.6%, while other cardiovascular diseases were 64.2%. this prevalence was higher compared to other studies conducted in different parts of the world with a range from14.3 to 56.5% (19-23).

Despite the evaluation of cardiovascular disease among our patients, we have asses also the impact of some of the risk factors in this disease for the elderly over 65 years old. Many studies have reported the impact of age, gender, and habits (such as alcohol, smoking, and physical activities) (24-29). Our findings were similar to the previous studies. We have found a significant association between the gender, where the males presented a risk 1.72 times for 95% CI [1.29-2.84], p-value <0.05. Also, with the increase of patients, the risk for cardiovascular diseases among T2DM patients also is very higher. So patients, 70-80 years old were 1.34times higher in risk for CVD [0.98-2.61], p-value 0.04, and those in age >80 years old 1.9 [1.01-3.4], p-value 0.002 compared to patients in age ≥65-69 years old. We found also a significant risk for alcohol use 2.3 [1.91-3.87], smoking use 1.7 [1.15-2.46], BMI (overweight, 1.5 [1.27-2.38], obese class I, 1.5 [1.27-2.38], obese class II-III, 3.8 [2.023-5.64]), physical activity 1.1 [0.5-1.8], family history 2.4 [1.8-4.3], and last but not least the comorbidities,1.8 [1.17-2.82]. In all cases, the p-value resulted in a significant <0.05.

Conclusion

The prevalence of CVD among our T2DM patients resulted relatively significant. Hypertension, coronary heart disease, and IM were the major contributors to CVD. We recommend more attention to the management of diabetes to reduce the risk of cardiovascular disease, in late life, in the geriatric population.

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DOI: 10.5281/zenodo.14788905