ORIGINAL ARTICLE

In Type 2 Diabetes Patients Cardiovascular-Renal Disease is a Lifetime Risk Factor

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ABSTRACT

Objective: The purpose of this research is to establish whether or not cardiovascular-renal illness is a life-threatening condition in people with type-2 diabetes by using a case-control design.

Study Design: Observational/Cohort study

Place and Duration: Lahore general hospital/ Mayo Hospital Lahore.Jan 2020-Jun 2020

Methods: This research had a total of 170 individuals, both sexes. Patients ranging in age from 20 to 85 were included in this study. All the patients had type 2 diabetes. Individuals who participated provided detailed demographic information such as their age and gender as well as their body mass index (BMI), blood pressure, cholesterol, glucose, smoking, physical activity, food, and comorbiditie. Frequency of CVRD among all cases was measured. Myocardial Infarction (MI), heart failure (HF), stroke, chronic kidney disease (CKD), all-cause mortality, and cardiovascular (CV) death rates were evaluated. Complete data was analyzed using SPSS 22.0 version.

Results: In current study males were 100 (58.8%) and 70 (41.2%) females in our study. Mean age of the patients was 56.8±8.98 years with mean BMI 30.5±6.34 kg/m^2. Mean systolic and diastolic blood pressure of all the cases were 129.3±7.41 and 79.6±4.61 mmHg. Physical inactivity was mostly found among 90 (52.9%) cases and frequency of smokers was 65 (38.2%) cases. Hypertension, obesity and hyperlipidemia were the most common comorbidities. 105 (61.8%) cases had cardiovascular renal disease in which myocardial infarction 55 (52.4%), heart failure 67 (63.8%), stroke 52 (49.5), CKD 90 (85.7%) and mortality 35 (33.3%) was significantly higher than that of the diabetic patients without cardiovascular renal disease.

Conclusion: In this research, we found that the cardiovascular renal disease among patients with type 2 diabetes found to be a lifetime risk resulted high number of myocardial infarction, heart failure, stroke and chronic kidney disease. There was high mortality rate among patients of diabetes 2 mellitus with CVRD.

Keywords: Type 2 Diabetes, Cardiovascular Renal Disease, Comorbidities, CKD, Mortality

INTRODUCTION

Type 2 diabetes and chronic kidney disease are anticipated to more than quadruple in the next two decades, according to the World Health Organization. When it comes to developing kidney disease, those with type 2 diabetes (T2DM) have a 25–40 percent higher risk than the general population. Cardiovascular disease (CVD) and early death are common in persons with diabetes and renal dysfunction. It is challenging for both people and public health experts to manage type 2 diabetes, chronic kidney disease (CKD), and risk factors. [3] [4–6] Type 2 diabetes is not the sole risk factor for kidney disease; nonetheless, it is one of numerous factors that contribute to this condition. [7]

Globally, diabetes mellitus ranks third among the primary causes of death and disability, after only heart disease and lung cancer. It accounts for 6.53 million [5.23–8.23] deaths and 171 million [144–201] disability-adjusted life years (DALYs). Approximately 693 million people are expected to be affected by diabetes in the globe by 2045, with a yearly cost of $1.31 trillion (95 percent confidence interval [CI] 1.28–1.36), or 1.8 percent of the global GDP. Diabetics with type 2 diabetes account for more than 90% of the population (T2D). It is essential to fully comprehend the long-term health concerns associated with type 2 diabetes in order to design a comprehensive preventative strategy.

Diabetic type 2 diabetes (T2D) is related with a higher risk of cardiovascular disease (CVD) and kidney illness, according to worldwide consensus guidelines. While these disorders have many clinical symptoms in common and are often co-morbid, they have mostly been researched in isolation, which is despite the fact that they share many clinical symptoms and are frequently co-morbid. [11] Drugs that block the angiotensin system or novel sodium-glucose cotransporter-2 (SGLT2) inhibitors have shown that the cardiovascular and renal systems are intertwined. [12] Despite the fact that the current coronavirus (COVID-19) pandemic has been linked to increased infection risk and catastrophic outcomes[12], there is still a paucity of evidence on the interaction between cardiovascular disease, renal disease, and type 2 diabetes. The ability to recognise how these diseases cluster over time may aid

in the development of more effective treatments and prevention strategies during and after an epidemic [13].

In affluent nations, end-stage renal disease (ESRD) is the leading cause of mortality. Unknowns are the number of persons with type 2 diabetes who develop end-stage renal disease (ESRD) and the types of patients that get ESRD. Few studies have looked at how kidney function changes over time in people with diabetes, and even fewer have looked at the factors that cause renal damage. Even among those who are believed to be at low risk for morbidity and death (including chronic kidney disease and cardiovascular disease), the vast majority are really at very high risk. [14] For the purpose of providing a more complete picture of the whole impact of a disease on the general population, lifetime risk estimates take into consideration not just an individual's current health dangers, but also future risks (such as mortality from other diseases) until they reach old age. For each person, estimations of their lifetime CVD and chronic kidney disease (CKD) risks have been generated. [15] Over their lives, those with a modest risk factor burden have a much decreased risk of developing cardiovascular disease (CVD).

Purpose of current study is to diagnose cardiovascular renal disease among T2DM patients and risk factors which leads to sudden death.

MATERIAL AND METHODS

This Observational/Cohort study was conducted at Lahore general hospital/ Mayo Hospital Lahore and comprised of 170 cases. Individuals who participated provided detailed demographic information such as their age and gender as well as their body mass index (BMI), blood pressure, cholesterol, glucose, smoking, physical activity, food, and comorbidities. Patients <20 years of age, type 1 diabetes and those did not provide any written consent were excluded from this study.

We included people between the ages of 20 and 85 who had never before been diagnosed with Type 2 Diabetes. CVRD risk factors included angina, a history of myocardial infarction, heart failure, stroke/transient ischemic attack, or nitrate use. Individuals

without CVRDs were used as a control group, whereas those who had just one co-morbid CVRD were also taken into account. The participants in the research were divided into six groups based on their pre-study CVRD status: 1) CVRD-free, 2) heart failure, 3) kidney disease, 4) myocardial infarction, 5) stroke, and 6) peripheral arterial disease. It is expected that there would be a substantial number of renal cardiovascular events (MARCE). MARCE was defined as the total number of fatalities and hospitalizations caused by cardiovascular disease (CVD), such as heart failure, renal disease, myocardial infarction, stroke, or peripheral arterial disease (PAD). The secondary effects of each MARCE component are distinct. we defined significant cardiovascular events as MI, stroke, and CV death in order to perform sensitivity analyses (MACE). In order to analyse all of the data, SPSS 22.0 version was used.

RESULTS

In current study males were 100 (58.8%) and 70 (41.2%) females. Mean age of the patients was 56.8±8.98 years with mean BMI 30.5±6.34 kg/m^2. Mean systolic and diastolic blood pressure of all the cases were 129.3±7.41 and 79.6±4.61 mmHg. Physical inactivity was mostly found among 90 (52.9%) cases and frequency of smokers was 65 (38.2%) cases. (table 1)

Table 1: Baseline characteristics of presented cases

Variables	Frequency	Percentage
Mean age (years)	56.8±8.98	
Mean BMI (kg/m^2)	30.5±6.34	
Gender		
Male	100	58.8
Female	70	41.2
Mean SBP (mmHg)	129.3±7.41	
Mean DBP (mmHg)	79.6±4.61	
Cause		
Smoking	65	38.2
Physical inactivity	90	52.9
Over weight	45	26.5

Hypertension, obesity and hyperlipidemia were the most common comorbidities.(Fig 1)
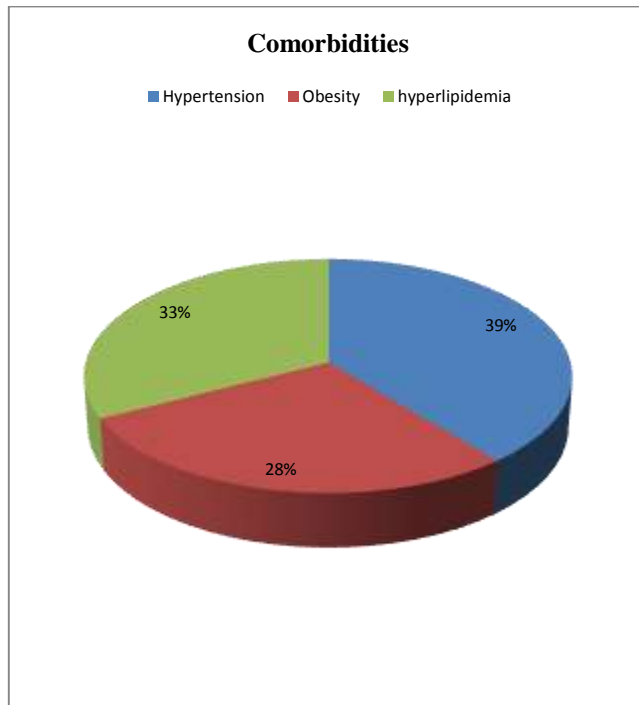

Figure 1: Association of comorbidities

105 (61.8%) cases had cardiovascular renal disease with T2DM.(fig 2)
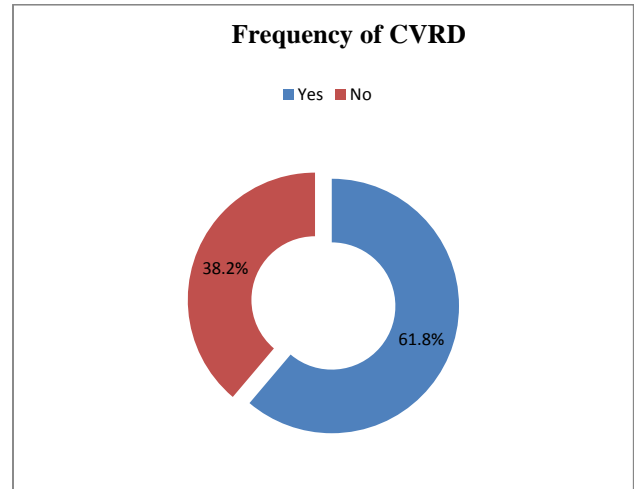

Figure 2: Prevalence of CVRD among cases

Among 105 cases of CVRD, frequency of myocardial infarction 55 (52.4%), heart failure 67 (63.8%), stroke 52 (49.5), CKD 90 (85.7%) and mortality 35 (33.3%).(table 2)

Table 2: Association of various diseases and mortality with CVRD

Variables	Frequency (n=105)	Percentage
MI		
Yes	55	52.4
No	50	47.6
HF		
Yes	67	63.8
No	38	36.2
Stroke		
Yes	52	49.5
No	53	51.5
CKD		
Yes	90	85.7
No	15	14.3
Mortality		
Yes	35	33.3
No	70	66.7

DISCUSSION

Already, patients with type 2 diabetes are worried about avoiding certain macro-and micro-vascular complications [16]. In order to lower the danger of severe COVID-19 or the overall global burden of illness, an increasing number of individuals are asking for prioritising the treatment of non-communicable diseases and numerous comorbidities during and after the pandemic. The 10-year limit is often employed in both clinical and public health operations when assessing the short-term hazard of a substance or practise. Due to the fact that almost all people with T2D and prior CVRD go on to develop more MARCE, short-term results may understate the whole burden of illness. A successful implementation of secondary prevention may result in significant savings for both individuals and health-care systems. [18] Researchers, physicians, and policymakers should be aware that CVRD is a significant lifetime risk for patients with type 2 diabetes (which is assumed to be a lesser risk by current prediction methodologies [19,20].

In present study 170 cases of T2DM were presented with ages 20-85 years. Most of the patients were males 100 (58.8%) and 70 (41.2%) females in our study. Mean age of the patients was 56.8±8.98 years with mean BMI 30.5±6.34 kg/m^2. Mean systolic and diastolic blood pressure of all the cases were 129.3±7.41 and 79.6±4.61 mmHg. Findings of our research were comparable to

the previous studies.[21,22 Physical inactivity was mostly found among 90 (52.9%) cases and frequency of smokers was 65 (38.2%) cases.[23] Hypertension, obesity and hyperlipidemia were the most common comorbidities. 105 (61.8%) cases had cardiovascular renal disease with T2DM. Among 105 cases of CVRD, frequency of myocardial infarction 55 (52.4%), heart failure 67 (63.8%), stroke 52 (49.5), CKD 90 (85.7%) and mortality 35 (33.3%). As a result of their diabetes, T2D patients have a one-in-two lifetime risk of renal disease, heart failure, and cardiovascular disease (CVRD) (at least 8 out of 10). There has been a focus on multi-morbidity as a starting point in T2D research and treatment, but less attention has been paid to how multi-morbidity develops over time [24], when the benefits of primordial and primary prevention are greater for individuals, organisations, and health systems. Much of the scientific and clinical discussion on multi-morbidity has concentrated on the sheer number of diseases and risk factors, rather than any specific combination of them. Studies have focused on cardiovascular disease (CVD). If you use traditional statistical methods (like regression analysis) or modern analytics (like clustering), you're more likely to get information on a single ailment, like CVRD [26].

There has certainly been a significant influence on the T2D patient population as a result of better pharmacological treatment, even if multiple randomised clinical studies have failed to show that tight glycemic control directly affects macrovascular outcomes, such as heart failure (HF). [27,28] Anti-diabetic medications' cardiovascular safety profile and methods of action may be more essential than their glucose-lowering benefits, as research has shown throughout time. A higher risk of heart failure (HF) has been linked to the use of sulfonylureas and thiazolidinediones, for example, than to the use of metformin or newer hypoglycemic medications. [29,30] People with type 2 diabetes (T2D) who have n history of cardiovascular or renal illness are more likely to have significant renal and cardiovascular complications in their lifetime. Patients with type 2 diabetes (T2D) should be educated about their lifetime risk of developing the disease, integrated treatment across specialities, primary prevention programmes, and improved utilisation of known medicines to reduce their risk.

CONCLUSION

In this research, we found that the cardiovascular renal disease among patients with type 2 diabetes found to be a lifetime risk resulted high number of myocardial infarction, heart failure, stroke and chronic kidney disease. There was high mortality rate among patients of diabetes 2 mellitus with CVRD.

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