

Correlation Between Type 2 Diabetes and Heart Failure in Asir Region of Saudi Arabia

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ABSTRACT

Background: Heart failure (HF) is a progressive and a complex clinical syndrome defined by dyspnea, orthopnea, or ankle swelling caused by a structural or functional cardiac defect, resulting in a reduced cardiac output and elevated intracardiac pressures at rest or during stress. Heart failure it is a global diseases that affects at least 26 million people and is becoming more common. Heart failure affects between 3 and 20 people out of every 1,000 people. In this study our aim is to find out the correlation between heart diseases and T2DM.

Methods: This observational study was carried out at Diabetes center The study was conducted in compliance with the ethical principles outlined in the Declaration of Helsinki. This study covered all eligible patients who met the inclusion and exclusion criteria of the study

Results: The medical records of 220 individuals from the two clinics were analyzed. Following the exclusion of 20 patients who did not match the inclusion criteria. the correlation coefficients of diastolic blood pressure, total cholesterol, and low-density lipoprotein cholesterol levels was computed SBP, DBP and LDL were comparatively higher risk factors. we have compared HbA1c levels among the patients and we have not observed any significance difference between the two genders. Glycated hemoglobin (HbA1c) and both genders are significantly associated with HFmrEF (LVEF ranges 40 to 49%, Heart failure with mild range ejection fraction) and HFrEF (Heart failure with reduced ejection fraction LVEF less than 40%)

Conclusion: There is a paucity of information on co-disease care techniques and clinical outcomes in HF patients with DM. To fill in these gaps, a prospective follow-up study required.

Keywords: Type 2 diabetes, Heart failure, Mortality, Chronic diseases

INTRODUCTION

Heart failure (HF) is a progressive and chronic clinical illness defined by dyspnea, orthopnea, or ankle swelling caused by a structural or functional cardiac defect, resulting in a reduced cardiac output and elevated intracardiac pressures at rest or during stress¹. Heart failure is a global pandemic that affects at least 26 million people and is becoming more common². Heart failure affects between 3 and 20 people out of every 1,000 people³.

Type 2 diabetes mellitus (T2DM) is a common non-communicable condition marked by hyperglycemia caused by a combination of insulin secretion abnormalities, insulin resistance, and increased glucagon secretion. In the last decade, the global prevalence of T2DM has increased by 30%. (2). In Malaysia, the National Health and Morbidity Survey (NHMS) 2015 revealed a prevalence of 17.5 % for adults over the age of 18, indicating an increase from 15.2 % in 2011^{4,5}.

T2DM is a well-known risk factor for cardiovascular illness, with T2DM being closely associated to heart failure⁶. According to the Framingham Heart Study, men and women with diabetes had a 2- and 5-fold increased risk of heart failure, respectively⁷. According to the OPTIMIZE-HF and EVEREST investigations, 40 % of patients hospitalized with heart failure had a diabetes diagnosis⁸⁻¹¹.

The left ventricular ejection fraction (LVEF) classification of HF patients has been found to have prognostic importance^{12,13}. The progression of heart failure and LV dysfunction is linked to poor

glycemic management and insulin resistance¹⁴. However, existing evidence suggests that there is no difference in the risk of heart failure worsening between individuals who receive intensive glycemic control and those who receive routine care¹⁵. Controlling cardiovascular risk factors in people with diabetes can help them avoid or delay heart attacks and strokes. According to studies, medications aimed at lowering blood pressure (BP) and low-density lipoprotein (LDL) cholesterol can considerably reduce macrovascular events in people with diabetes. In recent years, rather than focusing primarily on short-term hypoglycemia effects, researchers have increasingly focused on the effects of OADs on long-term results, particularly cardiovascular disease outcomes. Cardiovascular disease (CVD) is the leading cause of death and disability in diabetics¹⁶.

In this study our aim is to find out the correlation between heart diseases and T2DM.

METHODS

This observational study was carried out at Diabetes center The study was conducted in compliance with the ethical principles outlined in the Declaration of Helsinki. This study covered all eligible patients who met the following inclusion and exclusion criteria. diagnosed with heart failure based on clinical diagnosis and LVEF measurement by echocardiography.

Data from patients' medical records included demographic information such as age, gender, ethnicity, weight, and height, as well as clinical

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variables such as medical history, comorbidities, diabetes duration, and heart failure duration. Simple random sampling procedure was adopted.

Means and standard deviations were used to summarize descriptive statistics for continuous variables and counts and % ages were used for categorical data. SPSS version 222 software was used for data analysis Chi square test and regression tests were used to measure the significance differences and odd ratios at 5.00% level of significance. Correlation coefficients were also obtained.

Inclusion and Exclusion criteria:

Inclusion: Age (Above 18), Type 2 Diabetes Mellitus diagnosis at least one year, HbA1c being measured, regular follow up, LVEF measured by echocardiography, presence of HF symptoms, measured systolic BP, diastolic BP. LDL, HDL and TG measurement.

Exclusion: None of above, Type 1 Diabetes Mellitus , LVEF>50% (as heart failure with preserved ejection fractiob HFpEF), normal LVEF without symptoms of heart failure also excluded

RESULTS

The medical records of 220 individuals from the two clinics were analyzed. Following the exclusion of 20 patients who did not match the 200 patients were found to meet the requirements.

Out of which 70 were females while 130 were males. The mean (SD) of the age of study populations was 53.2(16.8).

In table 1 we have compared HBVA1C levels among the patients and we have not observed any significance difference between the two genders.

Table 1: HBVA1C levels among the patients

| | Male n,% | Female n,% | p-value |
|-------------|------------|------------|---------|
| HBVA1C <6.5 | 80 (61.5%) | 50 (38.5%) | 0.214 |
| HBVA1C >6.5 | 50 (71.5%) | 20 (28.5%) | |

Table 2: Correlation between Diabetes and CVD risk factors

Correlation coefficient

| | |
|---------------------------------|------|
| SBP (Systolic Blood pressure) | 0.85 |
| DBP (Diastolic Blood Pressure) | 0.78 |
| BMI (Body Mass index) | 0.65 |
| TG (Triglyceride) | 0.55 |
| LDL (low-density lipoprotein) | 0.84 |
| HD L (High-density lipoprotein) | 0.68 |

In Table 2, the correlation coefficients of, diastolic blood pressure, total cholesterol, and low-density lipoprotein cholesterol levels was computed SBP, DBP and LDL were comparatively higher risk factors.

Table 3: Odd Ratio's

| | HFmrEF | HFrEF |
|--------|------------------|------------------|
| | O.R (C.I) | O.R (C.I) |
| Male | 4.25 (1.58-12.9) | 2.65 (1.15-9.4) |
| Female | 2.5 (1.4-6.9) | 1.14 (1.04-1.98) |
| Age | 1.20 (0.94-1.98) | 0.98 (0.92-1.25) |
| HbA1c | 3.5(0.92-5.2) | 2.95 (0.89-3.5) |

As per table 3 HbA1c and both genders are significantly associated with HFmrEF (Heart failure with mild range ejection fraction)and HFrEF (Heart failure with reduced ejection fraction)

DISCUSSION

The control of risk variables is also influenced by proper treatment adherence. Several studies have found that diabetic patients rarely stick to their treatment plans, which has been associated to increased morbidity, mortality, and healthcare costs. In a review of the literature from 1966 to 2003, adherence ranged from 62% to 64%; good adherence is critical for obtaining optimal management of numerous CVD risk variables. Electronic patient monitoring systems can help enhance adherence. In order to improve adherence, it's also necessary to identify patients who aren't following their treatment plan¹⁷⁻²⁰.

The number of people with diabetes and poor glucose tolerance is steadily increasing. During routine physical tests, many patients discover that their blood sugar is elevated. Atherosclerosis and small vessel disease are major cause of mortality and morbidity in the most of diabetic individuals. As a result, people should be aware of the importance of prevention in their daily lives. Check the fasting and postprandial blood glucose levels before heading to the hospital for a physical examination to see if the blood glucose indicators are present. In the event of an aberrant condition, get medical help as soon as possible^{21,22}.

Saudi Arabia is not alone in the Middle East when it comes to poor control of CVD risk factors. For example, a retrospective UAE study of 382 diabetic patients found that 59 % did not meet their target glycated hemoglobin (HbA1c) values, 53 % did not meet their systolic blood pressure target values, 27 % did not meet their diastolic blood pressure target values, and 28 % did not meet their LDL concentration target values. A National Health Registry Study in Lebanon discovered that nearly half of the subjects had HbA1c levels of more than 8%, and more than half had total cholesterol levels of more than 5.0 mmol/L²³.

Because a significant proportion of patients in our study have an HbA1c greater than 6.5, there is an urgent need to aggressively decrease HbA1c. According to our findings, male gender was more associated with low LVEF. This gender disparity was consistent with findings from the Registry to Improve the Use of Evidence-Based Heart Failure Therapies in the Outpatient Setting (IMPROVE HF), which found that females were significantly associated with LVEF improvement when compared to males²³. Levels and bring them below 7%, while also considering tailored recommendations for high-risk individuals²⁴.

The length since diabetes diagnosis was not abstracted for this study, which is a problem. This information can be used to see if the patients have enough time in the hospital to control their risk factors.

CONCLUSION

There is a paucity of information on co-disease care techniques and clinical outcomes in HF patients with DM. To fill in these gaps, a prospective follow-up study is required. Patients with type 2 diabetes constitute a high-risk group for cardiovascular disease, demonstrating that the risk factors for cardiovascular disease examined in this article are closely linked to the presence of type 2 diabetes. We discover the risk factors that worsen cardiovascular disease in diabetic patients through the research in this article; that is, they are primarily caused by excessive smoking, diastolic blood pressure, total cholesterol, and unstable low-density lipoprotein cholesterol levels.

Intervention is needed to successfully lower the risk of cardiovascular and cerebrovascular disease in diabetic patients, as well as to prevent numerous diabetic complications and heart disorders.

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acquisition, analysis and interpretation of data; (2) drafting the article and revising it critically for important intellectual content; and (3) final approval of the manuscript version to be published.

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Competing Interest: None

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