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Research Article

Assessment of Cardiovascular Risk Factors Among Sudanese Patients with Type 2 Diabetes

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Abstract

Background: Individuals with type 2 diabetes who have optimum condition management are exposed to a significantly higher risk of developing cardiovascular disease (CVD) compared to those who do not have diabetes. People with diabetes are estimated to have a fourfold greater risk of developing CVD than people without diabetes. CVD risk factors other than diabetes include older age, obesity hypertension, dyslipidemia, smoking, and a family history of coronary or kidney diseases.

Objectives: The study aims to assess the cardiovascular risk factors among type2 diabetes at Ribat Hospital Diabetes Clinic, Sudan.

Methods: T2 DM patients were evaluated for the presence of CVD risk factors by using data collecting form to extract data verbally and from patients' files.

Results: Out of 147 T2 DM files, 92 (61.7 %) were female, 57 (38.3 %) were male, and 58 (38.9 %) patients were ≥ 60 year old. Patients who had poor glycemic control were 112 (75.2 %) and those who met the glycemic target were only 37 (24.8 %). Older age (P = 0.01) and diabetes duration (P = 0.026) were associated with poor glycemic control. Prevalence of hypertension was 61 (40.9 %), dyslipidemia 31 (20.8 %), and physical inactivity 112 (75.2 %). All patients had at least one CVD risk factor and those having all three risk factors were 48 (32.2 %).

Conclusion: All T2 DM diabetic patients in RHDC had at least one CVD risk factor and almost a third of them had all three risk factors. Poor glycemic control, physical inactivity, hypertension, and age ≥ 60 had the higher prevalence of CVD risk factors.

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1. Introduction

Type 2 diabetes mellitus (T2DM) is very widespread and is responsible for enormous morbidity and mortality. Moreover, it is a major financial exhaustion on individuals, families, health systems, and societies in general. The prevalence of DM globally continues to increase, rising to 10% of the population in many countries such as India and China, which are now, starting to simulate Western lifestyles. This substantial increment in the number of diabetics has led the experts to set the prediction that by 2045 >600 million individuals would be developing T2DM globally [1]. T2DM patients with optimum treatment conditions are prone to have a significantly higher risk of cardiovascular diseases (CVD) compared to those not having diabetes [2]. It has been estimated that people with diabetes have a fourfold greater risk of developing CVD than people without diabetes [3, 4]. In a systematic review among individuals with T2DM, the estimated prevalence of CVD was 32.2% and concluded that CVD was responsible for 50.3% of all deaths in patients with T2DM [5]. Several studies of patients with diabetes have revealed that close monitoring of glycemia substantially reduced CVD morbidity and mortality [6, 7]. The famous United Kingdom Prospective Diabetes Study (UKPDS) reported that 1% reduction in HbA1c concentration decreased micro and macro-vascular long-term diabetes-related complications and mortality [8]. Intensive glycemic control substantially lowers the risk of CVD, whilst poor control increases risk factors for CVD and other risk of diabetes complications and mortality [9, 10]. American diabetes association specifies HbA1C to be less than 7% in most patients with diabetes as an optimum target for glycemic control [9]. Many factors are linked to diabetes poor control such as older age, long duration of diabetes, sedentary lifestyle, non-adherence to medications, and patients awareness of diabetes and the disease treatment [10]. CVD risk factors other than diabetes include older age, obesity [11], hypertension, dyslipidemia, smoking, a family history of coronary diseases, chronic kidney disease, and the presence of albuminuria [12]. Intensive glycemic control together with appropriate management of other risk factors for CVD substantially reduced CVD morbidity and mortality [1, 6, 13]. Risk factors of developing CVD are more frequent in clinics treating diabetes in Sudan; however, studies regarding the actual proportion of diabetic patients with those risks are rare, therefore the present study was undertaken to specify the prevalence of risk factors for CVD among diabetic patients at Ribat University Hospital Diabetic Clinic (RUHDC), Sudan.

2. Materials and Methods

2.1. Study design, setting, and participants

This is a cross-sectional hospital based, single center study conducted at RUHDC, Sudan during April-May 2017 for two months. Records of 147 patients were registered in this study.

2.2. Inclusion and exclusion

All T2DM patients' records were selected for this study. The eligibility criteria for patients to participate in the study included their complete records, age ≥ 18, and regular medication from the past three months. The pregnant women and patients who refused to participate were excluded.

2.3. Sample size

Records of 187 patients attending RUHDC during the study period were examined. After the fast screening, 149 completed records were selected for this study.

2.4. Tools of data collection

The data collecting form was prepared in collaboration with staff members in Ribat University; Faculty of Pharmacy from recently updated literature. Finally, Data collecting form was further revised by researchers who are experts in diabetes treatment to ensure validity for the study objectives. Patients were informed about the aim of the study. Data collecting form included socio-demographic characteristics, most recent blood pressure measurement, and most recent serum concentrations of low-density lipoprotein (LDL), high-density lipoprotein (HDL), total cholesterol, triglycerides, and glycated hemoglobin (HbA1c). CVD risk factors are considered elevated as shown in Table 5. For precise assessment of the current status of control of CVD risk factors, the most recent, available during the last three months, HgA1c, lipid profile, and BP values were used. If any of them were unavailable, that file was excluded. Information including socio-demographic characteristics and physical inactivity was taken verbally from the patients. Physical activity was specified as performing of =150 min of moderate to vigorous-intensity exercise per week for the fit patients.

2.5. Data analysis

The process of analysis was conducted using SPSS version 16. Descriptive analysis was conducted for data and representation in tables as frequency and percentage. Binary logistic regression was carried out to specify factors that are associated with poor glycemic control. *P* value < 05 was estimated as statistically significant.

3. Results

In the current study, 147 T2DM patients' records were introduced for analysis. Females were 92 (61.7%), males 57 (38.3%), patients ≥ 60 years old were 58 (38.9 %), and < 60 were 91 (61.1%). The majority having a basic education level were 70 (47%), illiterate were 19 (12.8%), non-worker were 110 (73.8 %), officers were 32 (21.5%) (Table 1). A total of 112 (75.2%) patients had poor diabetes control (HbA1 C > 7%) and those who met the glycemic target were 37 (24.8%). Age (*P* = 0.01) and diabetes duration (*P* =0.026) were associated with glycemic poor control (Table 4). Prevalence of hypertension was 61 (40.9%), dyslipidemia 31 (20.8%), physical inactivity 112 (75.2%), and smoking was 6 (4%) (Table 2). All patients had at least one CVD risk factor; three risk factors were 48 (32.2%) and five risk factors were 6 (4%) (Table 3).

4. Discussion

Patients with diabetes are known to be at a greater risk for cardiovascular diseases than non-diabetic individuals, however intensive monitoring of recommended glycemic (Hb A1C) target to be in less than 7% together with appropriate management of other cardiovascular risk factors, reduce or delay development of CVD and other complications of diabetes.

This study revealed that almost quarter of the patients achieved the glycemic control target and this finding was comparable to Alramadanet alstudy who reported 24.1% [10], Alzahebet alstudy exhibited 25.1% [14] and Khattab et al study who showed 34.9% of the patients had attained the target level of glycemic control [15]. Age ((*p*-value: 0.010) and longer duration of diabetes (*p*-value: 0.026) in this study was associated of poor glycemic control and this result was consistent with that reported by many studies [10, 15, 16]. Hypertension is linked to cardiovascular mortality and morbidity risks which are twice-fold in the presence of diabetes; thus, intensifying T2DM cardiovascular complications [17]. Hypertension is predominant in individuals with diabetes [18] and considered a

major cause of CVD. In this work, almost 41% of our patients had hypertension and this result was less than Salman et al's study who reported 54.2% [17]. Physical activity is known to be a vital component of standard diabetes management [19], it protects individuals against hazards of CVD risk factors, long-term diabetes complications and strengthens the general health of the patients [20, 21]. Despite the positive effects of physical activity, a vast number of patients with diabetes are physically inactive [22]. Most patients in this work were physically inactive and these findings are in line with many studies [23, 24, 25]. Dyslipidemia is one of the major risk factors for cardiovascular disease in diabetes mellitus and this is attributed to the fact that diabetes can cause a variety of disarrangement in oxidative/reduction in lipid metabolic and regulatory mechanisms that might be responsible for the accumulation of lipids particles [26]. This study showed that almost one-fifth of patients had dyslipidemia and this result was better than Haile and his colleague's study in Ethiopia which reported 68.1% [27]. Moreover, Chamba et al.'s study from Tanzania reported 83% [28] and Hussein et al.'s study from Egypt exhibited that 60.7% had dyslipidemia [29]. The incidence of CVD, diabetes, and other complications related to diabetes arise among individuals aged older than 65 [30]. This work revealed that 60-year-old patients were linked to poor glycemic control (Hb A1C) and this increases the risk of CVD. Almost 39% of patients in this study aged 60 and this was higher than that reported by Hussein et al. [29] and Bello et al. [31] studies who reported 22.5% and 28.9% respectively. Although one CVD risk factor increases the risk of morbidity and mortality, the effect is enhanced when the combination is more than one [32]. In this study, all patients had at least one CVD risk factor and 32.2 % had three risk factors. The study by Hussien et al. from Egypt reported that all his patients had at least one CVD risk factor and 24.5% had three risk factors [29]. A study carried out in Saudi Arabia by Al Slail et al. showed that 31% of the patients had three CVD risk factors [33]. These findings from this group of patients need to be further authenticated by large and multicenter study, in particular, it needs to be determined whether having multiple CVD risk factors varies by socioeconomic status.

5. Conclusion

All T2 DM diabetic individuals in RHDC had at least one CVD risk factor and almost a third of them had three risk factors. Poor glycemic control, physical inactivity, hypertension, and age $\geq$ 60 had higher prevalence of CVD risk factors. Multiple CVD risk factors lead to a high burden on both the patients and the health system, especially in a

country such as Sudan. Therefore, it is essential that the healthcare system focuses on raising awareness among the population, and implements appropriate measures for prevention, early detection, and suitable management of CVD risk factors among patients with T2DM.

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Ethical Considerations

All T2DM individuals who volunteered to take part in this study were enrolled after signing a written agreement. The protocol and the written consent were approved by research board Faculty of Pharmacy, National Ribat University.

Conflict of Interest

None declared.

Availability of Data and Materials

All relevant data of this study are available to any interested researchers upon reasonable request to the corresponding author.

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