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ORIGINAL ARTICLE

The Relationship Between Erectile Dysfunction and Prediabetes

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Abstract

Introduction: Erectile dysfunction (ED) in men is a complication associated with diabetes mellitus (DM), which has become an important public health issue in both emerging and developed countries. ED threatens the well-being of patients. Therefore, identifying and controlling risk factors at an early stage is vital to prevent serious consequences and burden of this disease. This study was aimed to evaluate prediabetic risk factors in patients diagnosed with ED in the urology outpatient clinic.

Methods: A total of 40 volunteers diagnosed with ED in the 25–65 age group and 40 healthy volunteers with the same demographic characteristics, were included in the study. HbA1c levels were examined routinely in all volunteers participating in the study.

Results: HbA1c levels were found to be 5.94±1.12 in the patient group and 5.23±0.56 in the healthy control group and were found to be statistically significantly higher in the patient group ($p<0.001$). A moderate negative correlation was found between HbA1c and ED scoring in the patient group ($r=-0.574$, $p=0.000$).

Discussion and Conclusion: In this study, it was found that HbA1c level was associated with the risk of prediabetes in patients diagnosed with ED. Therefore, HbA1c levels should be examined regularly as a diabetes risk factor in patients diagnosed with ED.

Keywords: Diabetes mellitus; Erectile dysfunction; HbA1c; Prediabetes.

Erectile dysfunction (ED) is a disease defined as the recurrent or persistent inability to achieve and maintain a penile erection required for sexual intercourse[1]. The prevalence of ED is 52% in the 40–70 age range in the United States and 33% in men over the age of 40 in our country[2,3]. ED is one of the leading diseases affecting social, economic and psychological life[4]. It is a general problem especially in men with a history of DM[5]. ED is approximately 3 times more common in men with DM than in the normal population[6]. ED occurs in men with diabetes mellitus (DM), with frequencies ranging from 50% to 75[7]. ED is considered to be one of the most common complications of DM, as well as one of the important complications that highly affect the quality of life[8]. It is well known that high glucose levels trigger neuropathy and vasculopathy and are effective in the emergence of ED. Considering the comorbidities and health costs it brings with it, early diagnosis of DM is of great importance. The prevalence of type 2 DM is increasing rapidly globally[9]. The aim of this study is to determine the rate of prediabetes in patients who ap-

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plied to the urology outpatient clinic with ED clinic and to compare it with the general population to see whether ED is a significant biomarker for prediabetes.

Materials and Methods

Patients with ED between the ages of 25 and 65 who applied to the Urology Outpatient Clinic of Bezmialem Vakıf University and Esenler Avicenna Hospital between 01.05.2019 and 01.05.2020 were included in this study. It was calculated to include at least 40 volunteers for each group, 80 volunteers in total, to achieve 80% power at the α=0.05 significance level by power analysis. Since it is thought that it may be a precursor of DM in patients with a diagnosis of ED, the age range of the volunteers with a diagnosis of ED included in the study was selected as 25–65 years, considering the studies performed previously. ED in men aged sixty-six and older should not be considered a precursor for DM[10,11]. Healthy volunteers with the same demographic characteristics, without any chronic disease and not using regular medication, with ED, were also included in the healthy control group. Patients with a previous diagnosis of DM and psychogenic ED were not included in the study. The 5-question International Index of Erectile Function (IIEF-5) was used to assess the degree and diagnosis of ED. Those, who scored 25 and below, were accepted as ED and included in the study. These scores were categorized as mild, mild-moderate, moderate and severe.

Conditions where the plasma glucose level is higher than normal but does not reach the diagnostic limits of DM are defined as prediabetes. There are three definitions in the diagnostic criteria of prediabetes:

1. If fasting blood sugar is between 100 and 126 mg/dL, it is defined as impaired fasting glucose (IFG),
2. If the glucose level measured in the second postprandial hour in a 75-gram glucose tolerance test is between 140 and 200 mg/dL, it is defined as impaired glucose intolerance (IGT),
3. When HbA1c is between 5.7% and 6.4%[12].

To detect prediabetes, HbA1c percentages from blood samples taken from patients were studied in a routine biochemistry auto-analyzer. Ethics committee approval was obtained for the study from the Bezmialem Vakıf University Non-Interventional Research Ethics Committee, with the decision numbered 09/182 on 30.04.2019.

Statistical Analysis

Statistical analysis was performed using IBM SPSS 25.0. Kolmogorov–Smirnov test was used to determine the distribution of data. Mean±standard deviation values were used to express continuous variables. Student's t-test was used to compare variables between the two groups when the variable was normally distributed, and the Mann-Whitney U test was used when the variable was not normally distributed. Chi-square and Wilcoxon signed-rank tests were used to compare categorical variables. The relationship between numerical variables was evaluated with Pearson correlation coefficient, and the differences between groups were presented at 95% confidence intervals. $p<0.05$ was considered statistically significant.

Results

In this study, the mean age of the patient group with ED (n=40) was 39.75±8.57, and the mean age of the healthy control group (n=40) was 38.00±8.51, and no statistically significant difference was found between the groups. While HbA1c percentages were 5.94±1.12% in the study group with ED, it was 5.23±0.56% in healthy controls. HbA1c percentages were found to be statistically significantly higher in patients with ED compared to healthy controls ($p<0.001$). Prediabetes (HbA1c>5.7%) was detected in 21 (52.5%) patients in the ED patient group, while prediabetes (HbA1c>5.7%) was detected in 9 (22.5%) individuals in the healthy control group. The rate of prediabetes in patients with ED was detected to be 2.33 times higher than in the healthy control group (Tables 1 and 2).

When the relationship between age, HbA1c percentage and IIEF scores in patients diagnosed with ED was examined, no correlation was found between age and HbA1c ($r=-0.046$, $p=0.779$) and IIEF scoring ($r=-0.165$, $p=0.310$), while a moderate negative correlation was found between HbA1c and IIEF ($r=-0.574$, $p=0.000$).

Discussion

Due to its multifactorial pathophysiology and coexistence of vasculopathy, neuropathy, and depression, ED remains relevant in men with diabetes[13]. ED is defined as the inability to achieve and/or maintain an erection sufficient to permit satisfactory sexual intercourse[14]. Although ED

Table 1. Demographic data

	Erectile dysfunction patient group (n=40)	Healthy control group (n=40)
Mean age	39.75±8.57	38±8.51
Mean IEFF score	14.27±6.04	26.6±2.05

Table 2. HbA1c levels in patients with erectile dysfunction and healthy controls

	Erectile dysfunction patient group (n=40)	Healthy control group (n=40)
HbA1c (%)	5.94±1.12	5.23±0.56
HbA1c (%) (min-max)	4.64–9.97	4.32–7.04
Number of volunteers with prediabetes (HbA1c>5.7%)	21 (52.5%)	9 (22.5%)

is considered an age-related disease affecting 20% of men over the age of 40, it may be present throughout life from adolescence, especially when risk factors such as diabetes, metabolic syndrome or cardiovascular diseases coexist[15]. DM has been recognized as the main risk factor for the development of ED, and the association between DM and the development of ED has been documented in both animal models and humans since the 1970s[15]. It is known that ED and DM are closely related. In a study by Kendirci et al.,[3] it was shown that the risk of developing ED increases over time in men diagnosed with DM oi more than 30,000 men. When the studies investigating the relationship between ED and prediabetic patients with IFG or IGT are examined, different results are encountered. In a study by Burke et al.,[5] it was argued that ED cannot be used in the primary screening of prediabetes because it is not independently associated with IFG or IGT in healthy men. They stated that although IFG was 70% higher and type 2 DM 49% higher in patients with ED compared to men without ED, there was no statistical significance after adjusting for age. In a study by Ettala et al.,[16] on 926 healthy men, it was suggested that there was no significant relationship between prediabetes and ED, and ED could not be considered as a significant predictor of prediabetes. On the other hand, in the study of Sun et al.,[17] it has been suggested that ED may be an early sign of DM, especially in men under 45 years of age, due to endothelial and neuronal damage associated with persistent high serum glucose levels. ED is a multifactorial condition and neuronal, hormonal, vasculo-endothelial pathways are thought to be effective in its pathogenesis[18]. Its etiology includes factors such as hypertension, atherosclerosis, DM, insufficient physical activity, cardiac disease, smoking and polypharmacy[19]. Various reasons have been suggested for the occurrence of ED in men with DM. These are listed as poor glycemic control, duration of DM, obesity, smoking, advanced age, low high-density lipoprotein levels, neuropathy and retinopathy[20]. 5% of men who apply to the andrology outpatient clinic are diagnosed with DM. 11.4% of men who apply to the urology outpatient clinic due to ED had DM and 4.2% had IGT. Therefore, ED is worth investigating as it is a precursor of DM[21].

Although the number of patients in our study was sufficient, not including the glucose tolerance test, insulin resistance and fasting blood glucose levels in the study constitutes the deficiencies of our study.

Conclusion

The demonstration that prediabetes is more common in ED patients than in the general population suggests that ED may actually be an early symptom of DM. For this reason, it is useful to screen patients who present to the urology clinic with ED, with HbA1c percentage, in terms of possible risk of developing DM.

Ethics Committee Approval: Ethics committee approval was obtained for the study from the Bezmialem Vakıf University Non-Interventional Research Ethics Committee, with the decision numbered 09/182 on 30.04.2019.

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Conflict of Interest: None declared.

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