e-ISSN: 0976-822X, p-ISSN:2861-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2023; 15(3); 103-109

Original Research Article

A Cross-Sectional Observational Assessment of Erectile Dysfunction in Patients of Type 2 Diabetes Mellitus and its Association with Cardiovascular Risk

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Received: 06-01-2023/ Revised: 15-02-2023 / Accepted: 20-03-2023
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Conflict of interest: Nil

Abstract

Aim: The present study was planned to access CAD risk in T2 DM patients with erectile dysfunction.

Methods: In this cross-sectional observational study 200 diabetic patients (who visited to hospital attending medicine OPD) recruited which was diagnosed according to ADA revised criteria. This study was conducted for the period of two years in department of General medicine AIIMS Patna, Bihar, India.

Results: Out of 200 diabetic patient ED was present in 68 (34%) and ED was absent in 132 (66%). maximum frequency of moderate ED 44.11% was found then severe ED 32.35%, mild to moderate ED-14.70% and mild ED-8.82%. The age showed insignificant ($p>0.05$) relation with ED. Prevalence of ED was 34% in diabetic population. %. Duration of the diabetes, FBS and PPBS showed a significant correlation ($p<0.05$) with ED. Age, HbA1C, ASCVD risk showed insignificant ($p>0.05$) relation with ED. ASCVD risk showed insignificant ($p>0.05$) relation with ED. Maximum patients aged 46-55 years in moderate ED, severe ED found maximum in 35-45 years age group. BMI showed insignificant ($p>0.05$) relation with ED.

Conclusion: Poor glycemic control is a risk factor for ED. Fasting blood sugar and postprandial blood sugar showed significant ($p<0.05$) relation with ED. HbA1c show an insignificant correlation ($p>0.05$) with ED. Duration of diabetes have been associated with an increased risk of ED.

Keywords: T2 DM, ED, ASCVD.

Introduction

Prevalence of coronary artery disease in type-2 diabetic population is 55% as against 2 - 4% in the general population of comparable age group. [1] Seventy five percent of patients of type-2 diabetes and about 35% of those with type 1 diabetes die from cardiovascular cause. [2] The coronary artery disease is more prevalent in type-2 diabetics, it is also more severe and they more often have multi vessels disease as compared to age-matched non diabetics. [3] No other common complication of diabetes is erectile dysfunction with an estimated prevalence of 20-85% (ranging from mild to complete ED) which occurs at an earlier age than in non-diabetic men. [4] ED (Erectile dysfunction) is defined as inability to achieve and maintain an erection sufficient to permit satisfactory sexual intercourse.

[5] In the Massachusetts male ageing study, men with treated diabetes had a 28% age adjusted prevalence of complete ED (no erection), almost three times higher than the prevalence of complete ED observed in the entire sample of men (10%). It also showed the extremely deleterious epidemiologic link between coronary artery disease, diabetes and ED. [6]

In 2001 Cohn et al, advocated the measurement of arterial compliance to identify patients at risk for cardiovascular events before disease becomes apparent. Pulse countour analysis is a newly developed noninvasive method that allows for easy measurement of arterial elasticity. [7] The validity and reproducibility of brachial ankle pulse wave velocity (baPWV) measurement is considerably high and this method seems to be an acceptable marker, reflecting vascular damage. [8]

Increased age and duration of diabetes have been associated with an increased risk of ED. [9] DM type 2 (T2DM) is strongly associated with the development of ED, prevalence of ED of 35-90% in those with diabetes in different populations. [10,11] There are number of factors contributing for the ED in diabetic men such as hypertension, obesity, dyslipidaemia, smoking and autonomic neuropathy. [11] ED can present in the early stages of T2DM or sometimes diabetic patients can present as a chief complaint. The frequency of ED among diabetic men increased with age, from 60% in those aged 40-49 years to 94.95% in those aged ≥60 years. ED can therefore develop in diabetes owing to interplay between neuropathy, vasculopathy, hypogonadism, endothelial dysfunction and psychological factors. [12] The medications, patients are receiving for treatment of T2DM and their complications may influence ED. In particular, ED has been associated with the use of β-blockers, thiazide diuretics, metformin, antidepressants, statins, fibrates and drugs used for neuropathic pain such as pregabalin, gabapentin and opiate analgesics. Depression is more common in people with diabetes and studies have shown that ED is very closely linked with depression. [13]

ED in type 2 diabetes may be independent marker of CAD. A study in which the association of ED and asymptomatic CAD showed that 67% of patient had ED for a mean 38.8 months before developing symptom of CAD. [13] Endothelial dysfunction is the common link between ED and CAD. Artery size explains the onset of ED before occurrence of CAD. Coronary arteries are 3-4 mm in diameter, while the penile artery is of 1-2 mm in diameter. Endothelial dysfunction and plaque burden in small arteries may cause symptom of ED before the affect blood flow in large arteries. Depression is an independent risk factor for ED. Subnormal testosterone concentrations contribute to ED as testosterone regulates every component of erectile function.

The present study was planned to access CAD risk in T2 DM patients with erectile dysfunction.

Materials and Methods

In this cross-sectional observational study 200 diabetic patients (who visited to hospital attending medicine OPD) recruited which was diagnosed according to ADA revised criteria. This study was conducted for the period of two years in Department of General medicine AIIMS Patna, Bihar, India.

Inclusion criteria

Men aged >18 years with clinical diagnosis of type-2 diabetes were included in the study.

Exclusion criteria

Type 1 DM, patients with HbA1C ≥13% at screening visit, a recent history of diabetic ketoacidosis, patients with angina during

intercourse, unstable angina, any other evidence of recently diagnosed CAD, congestive heart failure, arrhythmia, poorly controlled blood pressure (systolic ≥170 or ≤90 mmHg) diastolic or orthostatic hypotension, a history of stroke/central nervous system injury or spinal-cord trauma within 6 months of study onset, hormonal deficiency or hypogonadism/decrease testosterone, pelvic trauma/pelvic surgery, severe depression with DASS score ≥21, peripheral vascular disease, significant renal and hepatic dysfunction (chronic kidney disease, chronic liver disease), severe anaemia with haemoglobin less than 6 gm/dl were to be excluded, premature ejaculation, drugs-beta blockers/diuretics/ angiotensin enzyme inhibitor/tricyclic anti-depressant (TCA) were excluded from the study.

Assessment tool

IIEF-5 The possible scores for the IIEF-5 range from 5 to 25 and ED was classified into 5 categories based on the scores: severe (5-7), moderate (8-11), mild to moderate (12-16), mild (17-21) and no ED (22-25).

ASCVD risk calculator

ASCVD risk is categorized as: low risk (<5%), border line risk (5% to 7.4%), intermediate risk (7.5% to 19.9%), high risk (>20%). Statistical analysis

The data thus obtained will be assessed, analysed and compared to find out difference in two groups with the help of chi-square test. Data of response in all three arms will be compared using chi square test. P value reports were two tailed and level of confidence of 0.05 was used to assess statistical significance.

Results

Table 1: Distribution of Erectile dysfunction

Erectile dysfunction	**N%**
Absent	132 (66)
Present	68 (34)
Frequency of erectile dysfunction	
Mild	6 (8.82)
Mild to moderate	10 (14.70)
Moderate	22 (32.35)
Severe	30 (44.11)

The table showed the distribution diabetic studied subjects on the basis of erection dysfunction. Out of 200 diabetic patient ED was present in 68 (34%) and ED was absent in 132 (66%). Maximum frequency of moderate ED 44.11% was found then severe ED 32.35%, mild to moderate ED-14.70% and mild ED-8.82%.

Table 2: Sociodemographic and clinical characteristic of the study populations

Variables	**ED present, n=68**	**ED absent, n=132**	**P value**
Age (years)	49.8±6.80	50.5±7.25	0.7
<40	5	9	
40-60	61	112	
>60	2	11	
Duration of diabetes (years)	7.35±3.08	8.24±4.54	0.003
<5	17	45	
5-10	40	50	
>10	11	37	
Systolic BP (mm Hg)	129.27±9.11	135.05±12.48	0.002

<139	60	84	
≥140	8	48	
Diastolic BP (mmHg)	79.90±8.79	80.86±7.96	
			0.654
<90	61	101	
>90	7	31	
BMI (kg/m^2)	24.06±2.78	23.97±2.48	
			0.556
<24.9	51	94	
≥25	17	38	
FBS (mg/dl)	185.35±54.86	168.71±50.56	
<125	7	17	0.025
≥126	61	115	
PP (mg/dl)	292.48±68.32	252.48±86.14	
<200	12	60	0.001
≥200	56	72	
HbA1C (%)	8.12±3.57	8.52±2.28	
<7	6	35	0.335
≥7	62	97	
ASCVD risk score (%)	9.11±4.86	8.82±5.75	
<5	14	32	0.675
5-7.4	21	30	
7.5-19.9	31	55	
>20	2	15	
T. cholesterol (mg/dl)	148.10±45.87	168.98±39.55	
<170	53	70	
≥170	15	62	0.003
HDL (mg/dl)	50.30±9.29	56.83±13.95	
<45	20	16	
≥45	48	116	
LDL (mg/dl)	68.92±29.81	85.95±28.52	
			0

The age showed insignificant (p>0.05) relation with ED. Prevalence of ED was 34% in diabetic population. %. Duration of the diabetes, FBS and PPBS showed a significant correlation (p<0.05) with ED. Age, HbA1C, ASCVD risk showed insignificant (p>0.05) relation with ED. ASCVD risk showed insignificant (p>0.05) relation with ED.

Table 3: ED severity by age group in type 2 diabetic men

ED severity	35-45 year	46-55 year	56-65 year	Total
Severe ED (1-7)	16	6	8	30
Moderate ED(7-11)	5	14	3	22
Mild to moderate (12-16)	3	5	2	10
Mild (17-21)	2	3	1	6

Chi square statistical analysis revealed a significant relation (p<0.05) between presence of severe V in relation with age. Maximum patients aged 46-55 years in moderate ED, severe ED found maximum in 35-45 years age group.

Table 4: Correlation between BMI (kg/m2) and ED

BMI (kg/m^2)	ED present	ED absent
Underweight <18.5	0	8
Normal (18.5-24.9)	52	94
Overweight (25-29.9)	16	30
Obesity class 1 (30-34.9)	0	0
Obesity class 2 (35-39.9)	0	0
Obesity class 3>40	0	0

BMI showed insignificant (p>0.05) relation with ED.

Discussion

Diabetes is a chronic metabolic disorder that is characterized by high level of blood glucose levels, which over a period of time can lead to micro-vascular (including retinopathy, neuropathy and nephropathy) or macro-vascular (including cardiovascular disease) complications. ED is common not much discussed and distressing complication of diabetes. ED is defined as the persistent (at least 6 months) inability to achieve and maintain penile erection sufficient that allows adequate sexual intercourse. [14] It is estimated that ED has affected more than 150 million men worldwide and this number will reach approximately 322 million by 2025. [14,15]

Schiavi et al, [16] studied 40 diabetic men, free from other illness or drugs that could affect sexual capacity and 40 age-matched healthy control subjects. ED was present in 77% of patients. Sundaram et al, [17] reported that in diabetic patients, the prevalence of ED was 66%. Ledda et al, [18] reported that ED was very common among diabetic patients. They had ED at an earlier age and prevalence was 75%. Sassayam et al, [19] studied 6112 Japanese male patients from 447 outpatient clinics and found that 81% had some degree of ED. Kloner [20] observed that the prevalence of ED in diabetic patients was about 75%. Sasaki et al, [21] reported prevalence of 90% in 1118 male diabetic patients. Prevalence rate was double than that of nondiabetic individuals. Among the socio-demographic variables, age was found to be statistically significant and majority of cases were found in 40-60 years of age in the present study. Influence of age on prevalence of ED is well established in both normal as well as T2DM men. In our study most of the patients were in the age group of 46-55 years 28, 35-45 years 26, 56-65 years 14 showed ED. Berardis et al reported that 34% of the patients reported frequent erectile problems, 24% reported occasional problems, and 42% reported no erectile problems. [22] Seid et al the overall prevalence of ED was 69.9%, with 32.9% suffering from mild, 31.7% moderate and 5.2% severe ED. [23]

Maximum frequency of moderate ED 44.11% was found then severe ED 32.35%, mild to moderate ED-14.70% and mild ED-8.82%. Chronic hyperglycaemia represents the major biochemical abnormality in the diabetic patient and was supposed to have a role in both microvascular and macrovascular diabetic complications. However, there was still disagreement about the role of glycaemic control as a risk factor for ED in diabetic men. Some observational studies had shown that a poor glycaemic control (HbA1c>7), as reflected by higher values of glycated haemoglobin A1c (HbA1c), was associated with higher risk of ED, whereas other studies did not find an association. The reasons for these divergent results were not evident. [24]

In our study in patients with ED was having more value of FBS, PPBS than patients without ED. In patients without ED was having more value of HbA1c than

patients with ED. There was no significant ($p>0.05$) difference in term of ASCVD risk score in ED patients ED and without ED patients. [25] In Jackson et al concluded that ED and cardiovascular disease share several risk factors that are similar and commonly coexist.10 ED in asymptomatic man may be a marker for underlying CAD. In our study, it was also observed that diabetic patients without ED had less coronary risk as compared to patients with ED but severity of ED did not correlate significantly with 10-years coronary risk. Various other workers had also reported significant correlation between ED and 10-years coronary risk. In patient with ED was having more value of ASCVD than patient without ED.

Conclusion

Poor glycemic control is a risk factor for ED. Fasting blood sugar and postprandial blood sugar showed significant ($p<0.05$) relation with ED. HbA1c show an insignificant correlation ($p>0.05$) with ED. Duration of diabetes have been associated with an increased risk of ED. Prevalence of ED was 34% in diabetic population. Duration of the diabetes showed a significant correlation ($p<0.05$) with ED. There was no significant ($p>0.05$) difference in term of ASCVD risk score in ED patients ED and without ED patients.

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