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# STUDY OF ERECTILE DYSFUNCTION IN PATIENTS OF TYPE 2 DIABETES MELLITUS AND ITS ASSOCIATION WITH CARDIOVASCULAR RISK

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**ABSTRACT**

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

**Methods:** In this observational study 100 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 1 year.

**Results:** Out of 100 diabetic patient ED was present in 32 (32%) and ED was absent in 68 (68%). Maximum frequency of moderate ED 43.75% was found then severe ED 31.25%, mild to moderate ED-15.62% and mild ED-9.37%. The age showed insignificant ($p>0.05$) relation with ED. Prevalence of ED was 32% 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. 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.

**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

## 1. INTRODUCTION

The incidence of diabetes mellitus (DM) is rising globally. Specifically, global prevalence in 2019 was estimated to be 9.3% (463 million people) and is expected to increase to 10.2% and 10.9% by 2030 and 2045, respectively. The majority (90%) of patients with DM have type 2 DM. Moreover, the estimated number of people aged 20–79 years who will be vulnerable to the disease is expected to rise to 700 million by 2045.[1,2] Erectile dysfunction (ED) is one of

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the most common complications among patients with DM, but it remains underestimated in this group. ED is the inability to achieve and sustain an erection sufficient to perform satisfactory sexual intercourse.[3] Some African countries have reported a higher prevalence of ED.[4,5]

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.[6] 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.[7] Increased age and duration of diabetes have been associated with an increased risk of ED.[8] 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.[9,10] There are number of factors contributing for the ED in diabetic men such as hypertension, obesity, dyslipidaemia, smoking and autonomic neuropathy.[10] 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.[11]

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.

## 2. MATERIALS AND METHODS

In this observational study 100 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 1 year.

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

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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.

## 3. RESULTS

Figure 1: Distribution of Erectile dysfunction

| **Erectile dysfunction** | **N%** |
|---|---|
| Absent | 68 (68) |
| Present | 32 (32) |
| **Frequency of erectile dysfunction** | |
| Mild | 3 (9.37) |
| Mild to moderate | 5 (15.62) |
| Moderate | 10 (31.25) |
| Severe | 14 (43.75) |

Out of 100 diabetic patient ED was present in 32 (34%) and ED was absent in 68 (68%). Maximum frequency of moderate ED 43.75% was found then severe ED 31.25%, mild to moderate ED-15.62% and mild ED-9.37%.

Table 2: Sociodemographic and clinical characteristic of the study populations

| **Variables** | **ED present,n=32** | **ED absent, n=68** | **P value** |
|---|---|---|---|
| **Age (years)** | 49.8±6.80 | 50.5±7.25 | 0.7 |
| **Duration of diabetes (years)** | 7.36±3.08 | 8.32±4.54 | 0.003 |
| **Systolic BP (mm Hg)** | 128.32±9.12 | 134.06±12.48 | 0.002 |
| **Diastolic BP (mmHg)** | 78.98±8.73 | 80.84±7.98 | 0.654 |
| **BMI (kg/m$^2$)** | 24.06±2.78 | 23.97±2.48 | 0.556 |
| **FBS (mg/dl)** | 185.35±54.86 | 168.71±50.56 | 0.025 |
| **PP (mg/dl)** | 292.48±68.32 | 252.48±86.14 | 0.001 |
| **HbA1C (%)** | 8.12±3.57 | 8.52±2.28 | 0.335 |
| **ASCVD risk score (%)** | 9.11±4.86 | 8.82±5.75 | 0.675 |

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| | | | |
|---|---|---|---|
| **T. cholesterol (mg/dl)** | 148.10±45.87 | 168.98±39.55 | 0.003 |
| **HDL (mg/dl)** | 50.30±9.29 | 56.83±13.95 | 0.002 |
| **LDL (mg/dl)** | 68.92±29.81 | 85.95±28.52 | 0.001 |

The age showed insignificant (p>0.05) relation with ED. Prevalence of ED was 32% 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) | 8 | 3 | 3 | 14 |
| Moderate ED(7-11) | 2 | 7 | 1 | 10 |
| Mild to moderate (12-16) | 1 | 3 | 1 | 5 |
| Mild (17-21) | 1 | 1 | 1 | 3 |

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 | 4 |
| Normal (18.5-24.9) | 26 | 42 |
| Overweight (25-29.9) | 6 | 22 |
| 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.

## 4. 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.[12] It is estimated that ED has affected more than 150 million men worldwide and this number will reach approximately 322 million by 2025.[12,13]

Schiavi et al,[14] 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,[15] reported that in diabetic patients, the prevalence of ED was 66%. Ledda et al,[16] reported that ED was very common among diabetic patients. They had ED at an

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earlier age and prevalence was 75%. Sassayam et al,[17] studied 6112 Japanese male patients from 447 outpatient clinics and found that 81% had some degree of ED. Kloner[18] observed that the prevalence of ED in diabetic patients was about 75%. Sasaki et al,[19] 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.[20] 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.[21]

Out of 100 diabetic patient ED was present in 32 (32%) and ED was absent in 68 (68%). Maximum frequency of moderate ED 43.75% was found then severe ED 31.25%, mild to moderate ED-15.62% and mild ED-9.37%. 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. The age showed insignificant ($p>0.05$) relation with ED. Prevalence of ED was 32% 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. 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. 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. In Jackson et al concluded that ED and cardiovascular disease share several risk factors that are similar and commonly coexist.[22] 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. BMI showed insignificant ($p>0.05$) relation with ED.

## 5. 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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