



Prevalence of Erectile Dysfunction in Type 2 Diabetes Mellitus (T2D) and Its Predictors in Diabetic Men

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Abstract

Introduction: Diabetes Mellitus is one of the common causes of morbidity and mortality globally. It has also been associated with erectile dysfunction adding to poor quality of life. Present study aimed to determine the prevalence of erectile dysfunction and its predictors in diabetic men.

Material and Methods: A hospital based cross sectional observational study was conducted at a tertiary care centre including 357 diabetic men recruited over one and half years. Erectile dysfunction was identified using International Index of Erectile Function (IIEF) score and independent predictors were identified using multiple logistic regression analysis.

Results: Erectile dysfunction was found in 212 (59.38%) diabetic males. Strong negative correlation was found

between potency score and age ($r = -0.647$), and moderate negative correlation with duration of DM ($r = -0.324$), Systolic and diastolic blood pressure. BMI, Fasting Blood Sugar, serum cholesterol and serum creatinine showed weak negative correlation with potency score. Serum testosterone level showed strong positive correlation with potency score. Age, systolic blood pressure, duration of diabetes, fasting blood sugar and Serum free testosterone ($p < 0.05$) were independent predictor of erectile dysfunction.

Conclusion: Prevalence of erectile dysfunction is high in diabetic males. Better blood sugar control and blood pressure control could reduce sexual dysfunction in diabetic men and improve quality of life.

Keywords: Diabetes, Diabetes mellitus, erectile dysfunction, sexual dysfunction, hyperglycemia.

Introduction

Diabetes Mellitus (DM) is one of the most common chronic diseases worldwide,¹ expected to rise significantly in coming decades,² with India already been called “The Diabetes capital of the world”. Diabetes is now one of the leading cause of death world wide.^{1,3} It is associated with both macro vascular (Cardio vascular Disease & stroke) and microvascular (including retinopathy, nephropathy, and neuropathy) complications.^{4,5}

Recent concept in the pathogenesis of Type 2 Diabetes Mellitus (T2DM) is an OMINOUS OCTET. Increased risk of Cardiovascular disease (CVD) results, in part, due to clustered risk factors accompanying diabetes⁶ including hypertension, elevated low-density lipoprotein cholesterol (LDL) and obesity⁷. Diabetics also have elevated risk for sight loss, foot and leg amputation, and renal failure, due to microvascular complications, which cause damage to the nerves and blood vessels.^{8,9}

Diabetes has also been associated with sexual dysfunction both in men¹⁰⁻¹² including increased risk of erectile dysfunction (ED).^{10,13} Among women, evidence regarding the association between diabetes and sexual dysfunction is less conclusive,¹⁴⁻¹⁶ though most studies have reported a higher prevalence of female sexual dysfunction (FSD) in diabetic women.¹⁷⁻²⁰

Though hyperglycemia is a main determinant of vascular diabetic complications, its role in pathogenesis of sexual dysfunction is unclear. Whereas clinical conditions like hypertension, obesity, metabolic syndrome, smoking, or atherogenic dyslipidemia, coexist with diabetes and are risk factors for sexual dysfunction.²¹⁻²⁵

Several studies have associated ED with cardiovascular risk factors, like diabetes,^{10,26,27} smoking,²⁸

hypertension,²⁹ hyperlipidemia,³¹ metabolic syndrome²² as well as depression³¹ lower urinary tract symptoms³² and poor health state.²⁶ Moreover, ED is a marker of significantly increased risk of CVD, CHD, stroke, and all cause mortality.³³⁻³⁶

ED is a common sexual disorder that increases with age in general population, However ED is known to occur at earlier age,¹⁰ is more severe¹¹ and less responsive to oral drugs^{37,38} in diabetes, leading to poor quality of life.^{11,39} Identification of factors associated with ED might prevent or delay its progression. Hence, present study with the objective to determine the proportion of Diabetics with Erectile dysfunction and to determine its associated factors.

Material and Methods

This Hospital based cross sectional, observational study was conducted in Department of General Medicine of one of the largest tertiary referral hospital of Northern India. A total 357 males with Type 2 Diabetes Mellitus (T2DM) aged 30 years and above were recruited over a period of one and half years. Patients with diagnosis of major depressive disorder or history of spinal or prostate surgery or other known secondary causes of erectile dysfunction were excluded from study.

Erectile Dysfunction is defined as the persistent inability to achieve or maintain penile erection for successful sexual intercourse⁴⁰ causing decreased quality of life in men^{26,39} In present study, Erectile Dysfunction was identified in study subjects using the International Index of Erectile Function (IIEF)-5.⁴¹ General, demographic and clinical information was obtained using a predesigned semi structured questionnaire Data collection was started after obtaining ethical clearance from Institutes Ethical Committee. Eligible Study

Subjects were recruited consecutively and written informed consent was obtained from all study subjects.

Inclusion Criteria

- Men with Type 2 Diabetes Mellitus (T2DM)
- Age > 30 years

Exclusion Criteria

- Patients with major depressive disorder
- H/O spinal or prostate surgery
- Accompaniment with any secondary cause

Statistical analyses

The qualitative variables were expressed as frequencies and percentages and analyzed using chi square test. Quantitative variables were expressed as mean and standard deviations and analyzed using student t-test. Correlation between continuous variables analyses by using Pearson correlation coefficient. Multiple logistic regression analysis was performed to find out the significant predictors of the erectile dysfunction. A p value < 0.05 was taken as statistically significant. All Statistical analyses were done using SPSS trial version 20.

Results

Erectile dysfunction was found in 212 patients (59.38%) diabetic males (Figure 1). The mean Potency score of diabetics with ED (11.45 ± 3.86) was significantly higher ($P < 0.001$) as compared to those without ED (23.34 ± 1.14). Strong negative correlation was found between potency score and age ($r = -0.647$), and moderate negative correlation with duration of DM ($r = -0.324$), Systolic and diastolic blood pressure. BMI, FBS, serum cholesterol and serum creatinine showed weak

negative correlation with potency score (Table 1). Serum testosterone level showed strong positive correlation with potency score (Figure 2). On univariate analysis, age, BMI, duration of DM, Fasting blood sugar (FBS), Systolic (SBP) and Diastolic blood pressure (DBP), serum total cholesterol, serum creatinine were found to be significantly associated with erectile dysfunction. Serum free testosterone was also significantly lower in those with ED (Table 2).

A test of full model was statistically significant indicating that the predictors as asset reliably distinguish between erectile dysfunction Status. (Chi square 174, df 7, $p < 0.001$). Also the Hosmer and Lemshow test shows a good fit by high p value and low Chi square value. (Chi square 9.44, df 8, $p > 0.05$). Nagelkerke R^2 of 0.522 indicates good relationship between predictors and grouping. Prediction success overall was 81.5%. The Wald criteria demonstrated that age, systolic blood pressure, duration of diabetes, fasting blood sugar and Serum free testosterone ($p < 0.05$) were independent predictor of erectile dysfunction (Table 3).

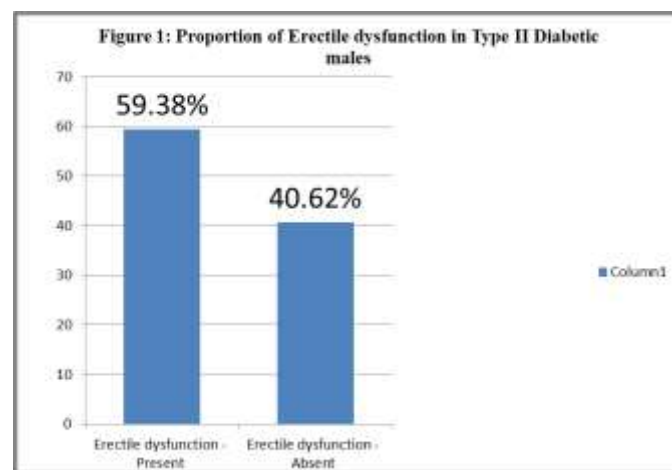


Table 1: Correlation of Potency Score with different suspected factors

Variables	Correlation coefficient	P value
Age	-0.647	<0.001
Duration of diabetes	-0.324	<0.001
SBP (mmHg)	-0.393	<0.001
DBP (mmHg)	-0.317	<0.001
BMI (kg/m ²)	-0.179	0.001
FBS (mg/dl)	-0.240	<0.001
HbA1C (%)	-0.057	0.282
Serum TG (mg/dl)	-0.004	0.947
Serum HDL (mg/dl)	0.103	0.052
Serum Cholestrol (mg/dl)	-0.132	0.013
Serum Creatinine (mg/dl)	-0.133	0.012
Serum Free Testosterone (pg/ml)	0.408	<0.001

Table 2: Factors associated with Erectile Dysfunction in Type 2 Diabetes Mellitus (T2DM)

Variables	ED Present (N=212)	ED absent (N=145)	P value
Age (Years)	56.36 ± 5.95	50.81 ± 5.60	<0.001
BMI (kg/m ²)	26.10 ± 2.45	27.35 ± 1.30	<0.001
Duration of DM (Years)	8.50 ± 5.87	6.01 ± 2.335	<0.001
Smoking N (%)	44 (20.8%)	23 (15.9%)	0.305
FBS (mg/dl)	148.42 ± 28.99	134.51 ± 15.73	<0.001
HbA1C (%)	8.11 ± 4.21	7.66 ± 0.90	0.213
SBP (mmHg)	135.08 ± 12.43	127.65 ± 7.45	<0.001
DBP (mmHg)	83.32 ± 6.6	80.06 ± 5.21	<0.001
Serum Triglyceride (mg/dl)	185.41 ± 48.88	188.55 ± 15.59	0.455
Serum HDL (mg/dl)	40.31 ± 5.31	39.61 ± 4.70	0.201
Serum Cholesterol (mg/dl)	183.26 ± 34.28	176.19 ± 15.08	0.021
Serum Creatinine (mg/dl)	1.22 ± 0.65	0.99 ± 0.14	0.002
Serum free Testosterone (pg/ml)	4.91 ± 0.86	5.95 ± 1.18	<0.001

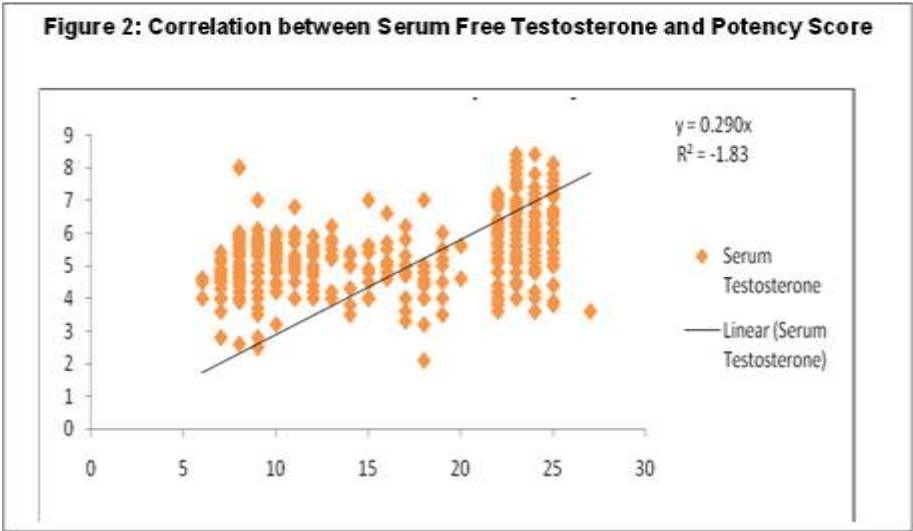


Table 3: Binary Logistic Regression for independent Predictors of Erectile Dysfunction in Diabetes Mellitus

Variables in the Equation							
		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 ^a	Age	.115	.029	16.01	1	.000	1.12
	SBP	.040	.016	6.57	1	.010	1.04
	Duration	.097	.049	3.90	1	.048	1.10
	FBS	.030	.008	12.76	1	.000	1.03
	Cholesterol	-.001	.005	0.02	1	.896	1.00
	Free Testosterone	-1.047	.158	43.87	1	.000	0.35
	Constant	-10.053	2.402	17.52	1	.000	0.00
a. Variable(s) entered on step 1: Age, SBP, Duration, FBS, Cholesterol, Testosterone.							

Discussion

Erectile Dysfunction is a common occurrence in aged men especially in Diabetic ones, who are affected with diabetic vasculopathy and neuropathy⁴²⁻⁴⁴. ED is associated with a reduced quality of life, and unfortunately occurs at an earlier age in diabetic patients in compare with the general population⁴⁵⁻⁴⁸

Erectile dysfunction was found in 59.39% diabetic men in present study. Previous studies have reported prevalence of erectile dysfunction among diabetic men varying between 35 and 90%.⁴⁹⁻⁵³ Other studies have reported erectile dysfunction in over 50% of diabetic

men in US¹⁸¹ and in 41% of diabetic men in the Netherlands.⁵⁵. Studies from Saudi diabetic patients reported ED among 80 to 90% of the patients^{56,57}. Higher prevalence reported by some studies could be explained by the fact that they did not exclude secondary psychological factors associated with ED leading to false high prevalence.

In present study, significant moderate correlation was found between potency score and age ($r = -0.647$), duration of DM ($r = -0.324$). Whereas Systolic and diastolic blood pressure. BMI, FBS, serum cholesterol and serum creatinine showed weak correlation with

potency score. Serum testosterone level showed strong positive correlation with potency score. Sharifi et al⁵⁸ in 2012 reported almost similar findings including significant moderate correlation with Age ($r = -0.44$) and weak correlation with SBP ($r = -0.18$), FBS ($r = -0.17$), GHB ($r = -0.2$) and S. Creatinine ($r = -0.2$).

Erectile dysfunction was found to be significantly associated with higher age. Similar finding had been reported in studies by Sharifi et al⁵⁸ and M-D Shi et al.⁶⁰ In present study the mean duration of Diabetes in patients with ED was significantly longer than those without ED which is in concordance with findings of Sharifi et al.⁵⁸ Higher mean Systolic and diastolic BP were also significantly associated with ED. other studies like those by Sharifi et al⁵⁸ and Fanuel et al⁶⁰ also reported significantly higher mean SBP and DBP in those with ED as compared to without ED.

BMI was significantly lower in the diabetic males with erectile dysfunction ($p < 0.001$). Contrary to this M-D Shi et al⁵⁹ reported slightly higher BMI ($27.72 \pm 4.36 \text{ kg/m}^2$) in those with ED as compared to those without ED ($27.13 \pm 3.65 \text{ kg/m}^2$). Some other studies have reported no correlation between ED and BMI.^{61,62}

In present study, mean FBS of patients with ED was significantly higher as compared to those without ED ($p < 0.001$) as was similarly found reported by Fanuel et al⁶⁰, however Sharifi et al⁵⁸ did not find any significant association of FBS with ED. No significant association was found between ED and HbA1C supporting the results of Sharifi et al⁵⁸. these findings indicate that immediate diabetic control is a possible predictor of ED rather than long term diabetic control.

Considering lipid profile, only serum cholesterol was found to be significantly associated with ED and serum triglyceride and HDL showed no significant association.

Sharifi et al⁵⁸ found no significant association with any lipid parameter while, Shi et al⁵⁹ found significant association with HDL. These varying results could be due to presence of confounding factors like hypolipidemic drugs not taken in consideration in these studies.

Mean creatinine level in those with ED was significantly higher ($p = 0.002$) as was similarly found in study by Sharifi et al.⁵⁸ Mean serum testosterone level in patients with ED was significantly lower than in those without ED mean level $5.95 \pm 1.17 \text{ pg/ml}$ ($p < 0.001$). This result was supported by findings of M-D Shi et al⁵⁹ Multiple logistic regression analysis found only age, systolic blood pressure, duration of diabetes, fasting blood sugar and S. free testosterone ($p < 0.05$) to be independently associated with erectile dysfunction in Diabetic men.

Conclusion

Prevalence of Erectile Dysfunction was found to be very high in men with Type 2 Diabetes Mellitus (T2DM). Age, Blood Pressure, duration of Diabetes, Fasting Blood Sugar and serum free Testosterone was independent predictors of Erectile Dysfunction in men with Type 2 Diabetes Mellitus (T2DM) and some of these are modifiable. Better control of Blood pressure and blood sugar level may reduce the prevalence of erectile dysfunction in diabetic, thus improve quality of life and reduce the economic impact associated with its management.

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