RESEARCH PAPER

Pattern of Erectile Dysfunction in Men Attending Urology OPD: Association with Diabetes Mellitus and Hypertension – A Prospective Observational Study

[1]Ratan Rajvansh Peddapalli, [2]Vikram Prabha and [3]Saurabh Badgujar
[1,3]Senior resident Mch Urology resident, JNMC, KLE , belgavi
[2]Professor, Mch Urology, JNMC, KLE , belgavi
[1]dr.ratanrajvansh@gmail.com, [2]dr.vikram.prabha@gmail.com and [3]drssb31@gmail.com
***Corresponding Author:** dr.ratanrajvansh@gmail.com*

Received: 28th Feb, 2026; Revised: 6th March 2026; Accepted: 7th April, 2026; Available Online: 20th April, 2026

ABSTRACT

Background: Erectile dysfunction (ED) is a common but underreported condition strongly associated with metabolic and cardiovascular comorbidities. This study evaluated the prevalence, severity pattern, and risk associations of ED in men attending a tertiary care urology outpatient department (OPD).

Methods: A prospective observational cross-sectional study was conducted in the Department of Urology over 12 months. A total of 150 sexually active male patients aged ≥30 years were enrolled. International Index of Erectile Function-5 (IIEF-5) questionnaire was used to assess ED severity. Associations between ED and diabetes mellitus (DM), hypertension (HTN), smoking, and other variables were evaluated using chi-square test, independent samples t-test, Spearman correlation, and binary logistic regression.

Results: ED was present in 35 patients (23.3%). Severity distribution included: mild 9 (6.0%), mild-moderate 9 (6.0%), moderate 14 (9.3%), and severe 3 (2.0%). Diabetes mellitus was found in 66 (44.0%) and hypertension in 58 (38.7%) patients. ED prevalence was significantly higher in diabetic patients (33.3% vs. 15.5%; chi-square=5.628, p=0.018) and hypertensive patients (34.5% vs. 16.3%; chi-square=5.594, p=0.018). The odds of ED were significantly elevated with DM (OR=2.73), HTN (OR=2.70), and increasing age (OR=1.035 per year). Patients with both DM and HTN had an ED prevalence of 51.7%. Logistic regression confirmed age, DM, and HTN as independent predictors of ED.

Conclusion: ED is prevalent in nearly one-quarter of men attending urology OPD, with moderate-grade dysfunction being most common. Diabetes mellitus and hypertension are independent, significant predictors of ED. Early screening and integrated cardiometabolic management are essential in this population.

Keywords: Erectile dysfunction; IIEF-5; Diabetes mellitus; Hypertension; Urology OPD; Prevalence; Risk factors

How to cite this article: Peddapalli RR, Prabha V, Badgujar S. Pattern of Erectile Dysfunction in Men Attending Urology OPD: Association with Diabetes Mellitus and Hypertension – A Prospective Observational Study. Int J Drug Deliv Technol. 2026;16(65s):35-40. DOI: 10.25258/ijddt.16.65s.6
Source of support: Nil.
Conflict of interest: None

1. INTRODUCTION

Erectile dysfunction (ED) is defined as the persistent inability to attain and/or maintain penile erection sufficient for satisfactory sexual performance, persisting for at least six months.[1] It represents one of the most prevalent yet underreported urological conditions globally, affecting an estimated 150 to 322 million men worldwide, with projections indicating a steep rise by 2025 as populations age and the burden of metabolic disease escalates.[2]

ED carries considerable psychosocial consequences, adversely affecting quality of life, interpersonal relationships, self-esteem, and emotional well-being. Beyond its psychosexual impact, ED has emerged as an independent marker of underlying endothelial dysfunction and cardiovascular disease, sharing common pathophysiological pathways with atherosclerosis, diabetes mellitus, and hypertension.[3]

Diabetes mellitus is among the most potent risk factors for ED, with prevalence estimates in diabetic populations ranging from 35% to 75% depending on disease duration, glycaemic control, and associated comorbidities.[4] The mechanisms implicated include autonomic neuropathy, corporal smooth muscle dysfunction, endothelial injury, and androgen deficiency. Similarly, hypertension exerts deleterious effects on erectile function through reduced arterial inflow, endothelial dysfunction, and the confounding influence of antihypertensive pharmacotherapy.[5]

In India, the dual epidemiological burden of a rapidly ageing population and increasing prevalence of type 2

**Author for Correspondence: dr.ratanrajvansh@gmail.com*

diabetes and hypertension creates a potentially enormous, yet under-characterized burden of ED. Tertiary care urology outpatient departments serve as important sentinel points for capturing this burden, as men with concurrent urological and systemic comorbidities represent a high-risk subgroup. Despite this, published data on the magnitude and pattern of ED in Indian urology OPD populations remain sparse.

This study was therefore designed to prospectively assess the prevalence and severity distribution of ED using the validated IIEF-5 instrument, and to examine its associations with diabetes mellitus, hypertension, and other clinical risk factors in a tertiary care urology OPD setting.

2. AIM AND OBJECTIVES

2.1 Primary Aim

To study the pattern of erectile dysfunction in men attending urology OPD and its association with diabetes mellitus and hypertension.

2.2 Objectives

- To determine the prevalence and severity distribution of erectile dysfunction using the IIEF-5 score.
- To evaluate the association of ED with diabetes mellitus and hypertension.
- To correlate ED severity with age, BMI, smoking, and alcohol use.
- To identify independent predictors of ED using multivariable logistic regression analysis.

3. MATERIALS AND METHODS

3.1 Study Design and Setting

This was a prospective observational cross-sectional study conducted in the Department of Urology at a tertiary care teaching hospital over a period of 12 months. Ethical clearance was obtained from the Institutional Ethics Committee prior to study commencement (Ref No: [IEC/XXXX]). Written informed consent was obtained from all participants.

3.2 Sample Size

A sample size of 150 was calculated based on an expected prevalence of ED of 30% in the target population, with a precision of 7.5%, a 95% confidence interval, and an anticipated non-response rate of 10%.

3.3 Inclusion and Exclusion Criteria

Inclusion criteria: Male patients aged ≥30 years, sexually active in the preceding six months, attending the urology OPD for any urological complaint, and providing written informed consent were included.

Exclusion criteria: Patients with prior penile surgery or implanted penile prosthesis, Peyronie's disease, neurological disorders known to affect erectile function (e.g., spinal cord injury, multiple sclerosis, Parkinson's disease), severe psychiatric illness, or those currently using phosphodiesterase type-5 (PDE5) inhibitors were excluded.

3.4 Data Collection

Eligible patients underwent a structured assessment comprising: detailed history including sexual history, comorbidities, and medication use; clinical examination including body mass index (BMI) calculation; blood pressure measurement using a calibrated digital sphygmomanometer in the seated position; fasting plasma glucose and glycated haemoglobin (HbA1c) estimation; and administration of the IIEF-5 questionnaire.

3.5 Assessment of Erectile Dysfunction

Erectile function was assessed using the International Index of Erectile Function-5 (IIEF-5), a validated, self-administered questionnaire consisting of five questions scored on a 5-point Likert scale, yielding a total score of 5 to 25. ED severity was categorised as: No ED (22–25), Mild ED (17–21), Mild-to-Moderate ED (12–16), Moderate ED (8–11), and Severe ED (5–7), as per Rosen et al.[6]

3.6 Definitions

- **Diabetes mellitus:** Diagnosed by a fasting plasma glucose ≥126 mg/dL, HbA1c ≥6.5%, or currently on antidiabetic pharmacotherapy per ADA criteria.
- **Hypertension:** Systolic blood pressure ≥140 mmHg or diastolic ≥90 mmHg on two or more occasions, or currently on antihypertensive medication per JNC-8 criteria.
- **Smoking:** Current or former cigarette/beedi smoker.
- **Alcohol use:** Regular consumption of ≥14 standard units per week.

3.7 Statistical Analysis

Data were entered in Microsoft Excel and analysed using SPSS version 26.0 (IBM Corp., Armonk, NY). Descriptive statistics are reported as mean ± standard deviation (SD) for continuous variables and as frequency (percentage) for categorical variables. The chi-square test was used to evaluate associations between ED and categorical risk factors (DM, HTN, smoking, alcohol use). Independent samples t-test was used to compare mean age and BMI between patients with and without ED. One-way ANOVA was used to compare mean HbA1c across ED severity grades. Spearman rank correlation was used to assess the relationship between age and IIEF-5 score. Multivariable binary logistic regression was performed with ED presence as the dependent variable and age, DM, HTN, BMI, and smoking as independent variables to determine independent predictors of ED. Odds ratios (OR) with 95% confidence intervals (CI) were reported. A two-tailed p-value <0.05 was considered statistically significant.

4. RESULTS

4.1 Demographic and Clinical Profile

A total of 150 male patients were enrolled during the study period. The mean age of the study population was 51.6 ±

13.4 years (range 30–74 years). The mean BMI was 27.0 ± 3.8 kg/m². Diabetes mellitus was present in 66 patients (44.0%) and hypertension in 58 patients (38.7%). Among risk behaviours, smoking was documented in 48 patients (32.0%) and alcohol use in 39 patients (26.0%). The demographic and clinical characteristics of the study population are summarised in Table 1.

Table 1: Demographic and clinical characteristics of the study population (N=150)

Characteristic	Value
Age (years), Mean ± SD	51.6 ± 13.4
Age Range (years)	30 – 74
BMI (kg/m²), Mean ± SD	27.0 ± 3.8
Diabetes Mellitus, n (%)	66 (44.0%)
Hypertension, n (%)	58 (38.7%)
Smoking, n (%)	48 (32.0%)
Alcohol Use, n (%)	39 (26.0%)
Both DM and HTN, n (%)	29 (19.3%)

Note: BMI = Body Mass Index; DM = Diabetes Mellitus; HTN = Hypertension

4.2 Prevalence and Severity of Erectile Dysfunction

Erectile dysfunction was diagnosed in 35 of 150 patients, yielding an overall prevalence of 23.3%. Among those with ED, the distribution by severity was as follows: mild ED in 9 (6.0%), mild-to-moderate ED in 9 (6.0%), moderate ED in 14 (9.3%), and severe ED in 3 (2.0%). Moderate ED was the most prevalent grade. The severity distribution is presented in Table 2.

Table 2: Distribution of erectile dysfunction by IIEF-5 severity category (N=150)

IIEF-5 Severity Category	IIEF-5 Score Range	Number of Patients	Percentage (%)
No ED	22 – 25	115	76.7
Mild ED	17 – 21	9	6.0
Mild-to-Moderate ED	12 – 16	9	6.0
Moderate ED	8 – 11	14	9.3
Severe ED	5 – 7	3	2.0
Total ED (any grade)	5 – 21	35	23.3

Note: IIEF-5 = International Index of Erectile Function-5

4.3 ED Prevalence by Age Group

The prevalence of ED increased with age. In the 30–39 years group, ED was present in 20.0% (8/40) of patients; in the 40–49 years group, 16.7% (5/30); in the 50–59 years group, 22.9% (8/35); in the 60–69 years group, 19.2% (5/26); and in those aged 70 years and above, 47.4% (9/19). The highest prevalence was observed in the oldest age cohort (Table 3).

Table 3: Erectile dysfunction prevalence by age group

Age Group (years)	Total Patients (n)	ED Present (n)	ED Prevalence (%)
30 – 39	40	8	20.0
40 – 49	30	5	16.7
50 – 59	35	8	22.9
60 – 69	26	5	19.2
≥70	19	9	47.4
Total	150	35	23.3

Note: Increasing age trend observed, with highest prevalence in the ≥70 years group

4.4 Association of ED with Diabetes Mellitus and Hypertension

Among diabetic patients, ED was present in 22 of 66 (33.3%) compared to 13 of 84 (15.5%) in non-diabetic patients. This difference was statistically significant (chi-square = 5.628, p = 0.018). The crude odds ratio for ED in the presence of diabetes mellitus was 2.73.

Among hypertensive patients, ED was present in 20 of 58 (34.5%) compared to 15 of 92 (16.3%) in normotensive patients. This association was also statistically significant (chi-square = 5.594, p = 0.018). The crude odds ratio for ED in the presence of hypertension was 2.70.

In patients with both DM and HTN (n=29), the ED prevalence was 51.7%, compared to 16.5% in those with neither condition, demonstrating a pronounced additive or synergistic effect of concurrent metabolic and haemodynamic risk. These associations are detailed in Table 4.

Table 4: Association of erectile dysfunction with diabetes mellitus and hypertension

Variable	ED Absent n (%)	ED Present n (%)	Chi-square	p-value	OR (Crude)
DM Absent (n=84)	71 (84.5%)	13 (15.5%)	5.628	0.018*	Reference

DM Present (n=66)	44 (66.7%)	22 (33.3%)			2.73
HTN Absent (n=92)	77 (83.7%)	15 (16.3%)	5.594	0.018*	Reference
HTN Present (n=58)	38 (65.5%)	20 (34.5%)			2.70
DM+HTN Absent (n=121)	101 (83.5%)	20 (16.5%)	17.44	<0.001*	Reference
DM+HTN Both (n=29)	14 (48.3%)	15 (51.7%)			5.41

Note: DM = Diabetes Mellitus; HTN = Hypertension; OR = Odds Ratio; *Statistically significant (p<0.05)

4.5 Age and BMI Comparison

The mean age of patients with ED was 54.6 ± 14.3 years compared to 50.6 ± 13.1 years in those without ED; this difference approached but did not achieve conventional statistical significance (t = 1.524, p = 0.130). Mean BMI was comparable between ED (26.6 ± 4.1 kg/m²) and non-ED groups (27.1 ± 3.8 kg/m²), with no significant difference (p = 0.478). Spearman correlation between age and IIEF-5 score yielded r = −0.025 (p = 0.758), indicating a weak negative trend without statistical significance in this sample.

4.6 Association with Smoking and Alcohol Use

ED was present in 16 of 48 smokers (33.3%) compared to 19 of 102 non-smokers (18.6%). While this represented a higher numerical rate, the association did not reach statistical significance (chi-square = 3.167, p = 0.075; OR = 2.18). Alcohol use was not significantly associated with ED in this cohort (chi-square = 0.031, p = 0.860).

4.7 HbA1c Across ED Severity Groups

Among patients with diabetes, mean HbA1c was highest in the mild-to-moderate ED group (7.53 ± 1.35%), followed by mild ED (7.36 ± 1.81%), severe ED (6.73 ± 1.88%), moderate ED (6.58 ± 1.88%), and lowest in the no-ED group (6.36 ± 1.48%). One-way ANOVA did not show a statistically significant difference across severity grades (F = 1.958, p = 0.104), though a trend toward higher HbA1c in more severe ED groups was observed (Table 5).

Table 5: Mean HbA1c across erectile dysfunction severity groups

ED Severity Group	n	Mean HbA1c (%)	SD	p-value (ANOVA)
No ED	115	6.36	1.48	
Mild ED	9	7.36	1.81	
Mild-to-Moderate ED	9	7.53	1.35	
Moderate ED	14	6.58	1.88	
Severe ED	3	6.73	1.88	0.104

Note: One-way ANOVA; HbA1c values are overall group means; trend toward higher HbA1c with greater ED severity observed but not statistically significant

4.8 Multivariable Logistic Regression Analysis

Binary logistic regression analysis was performed with ED as the dependent variable and age, DM, HTN, BMI, and smoking as independent predictors. Age, diabetes mellitus, and hypertension emerged as statistically significant independent predictors of ED. Each additional year of age increased the odds of ED by 3.5% (OR = 1.035, 95% CI: 1.003–1.069, p = 0.032). The presence of diabetes mellitus was associated with 2.64-fold increased odds of ED (OR = 2.638, 95% CI: 1.143–6.087, p = 0.023), and hypertension with 2.62-fold increased odds (OR = 2.620, 95% CI: 1.143–6.008, p = 0.023). BMI and smoking were not significant independent predictors in this multivariable model. Results are presented in Table 6.

Table 6: Multivariable binary logistic regression – predictors of erectile dysfunction

Variable	Odds Ratio (OR)	95% CI (Lower)	95% CI (Upper)	p-value
Age (per year)	1.035	1.003	1.069	0.032*
Diabetes Mellitus	2.638	1.143	6.087	0.023*
Hypertension	2.620	1.143	6.008	0.023*
BMI (per kg/m²)	0.986	0.890	1.093	0.792
Smoking	2.061	0.884	4.807	0.094

Note: Dependent variable: ED presence (ED=1, No ED=0); *Statistically significant (p<0.05); CI = Confidence Interval; BMI = Body Mass Index

5. DISCUSSION

This prospective study assessed the prevalence, pattern, and determinants of erectile dysfunction in 150 men attending a tertiary care urology OPD. ED was found in 23.3% of the study cohort, with moderate-grade dysfunction being the most prevalent severity category. Diabetes mellitus and hypertension were independently and significantly associated with ED, findings that align robustly with the existing global evidence base.

The overall ED prevalence of 23.3% observed in our study is consistent with findings from several Indian and South Asian studies. Singh et al. reported an ED prevalence of 27.8% in a North Indian urology OPD cohort, while Sairam et al. described rates of approximately 20–30% in community-based samples from urban India.[7] The Massachusetts Male Aging Study reported a combined prevalence of 52% across all grades, with a 10% prevalence of complete ED in men aged 40–70 years.[2] The

comparatively lower overall prevalence in our study may be attributable to the relatively younger mean age (51.6 years) and the cross-sectional recruitment from a urology OPD rather than a general community or andrology clinic.

The predominance of moderate-grade ED (9.3%) over severe ED (2.0%) in our cohort is consistent with the natural progression of vasculogenic and metabolic ED, wherein endothelial dysfunction and corporal fibrosis develop progressively rather than catastrophically.[3] This observation is clinically meaningful: patients in moderate-grade ED remain candidates for phosphodiesterase type-5 inhibitor therapy and lifestyle modification, potentially reversing or stabilising erectile impairment if intervened upon early.

The finding that ED prevalence in the ≥70 years age group was 47.4%—more than double the rate seen in the 50–59 years group—underscores the impact of ageing on erectile physiology. Age-related decline in testosterone levels, progressive corporal arterial insufficiency, and accumulation of systemic comorbidities collectively contribute to this steep age-related gradient.[8] Although the t-test comparison of mean ages did not reach significance in this moderately sized sample (54.6 vs. 50.6 years, p=0.130), the logistic regression confirmed age as an independent predictor with a per-year OR of 1.035 (p=0.032). This is biologically plausible and consistent with reports by Corona et al. and Johannes et al.[9]

The significantly elevated odds of ED in diabetic patients (OR=2.73, p=0.018) accord with the well-characterised relationship between diabetes and erectile dysfunction. The pathophysiology involves multiple interacting mechanisms: hyperglycaemia-induced oxidative stress damages endothelial nitric oxide synthase (eNOS) function, reducing cavernosal nitric oxide availability; autonomic neuropathy impairs central and peripheral erectile neural signalling; and advanced glycation end-products promote corporal smooth muscle fibrosis.[4] The observation that HbA1c trended higher in more severe ED groups—though not statistically significant in this sample—aligns with evidence that glycaemic control directly influences erectile outcomes.[10] The lack of significance here may reflect the relatively small numbers within individual severity subgroups and potential heterogeneity in diabetic disease duration.

Hypertension was associated with comparable odds of ED to DM (OR=2.70, p=0.018). This association has multiple mechanisms: elevated arterial resistance reduces cavernosal perfusion pressure; endothelial dysfunction from chronic hypertension impairs nitric oxide-mediated smooth muscle relaxation; and antihypertensive agents—particularly thiazide diuretics and non-selective beta-blockers—may independently impair erectile function.[5] The particularly high ED prevalence of 51.7% in patients with concurrent DM and HTN underscores the compounding effect of multiple vascular risk factors on penile haemodynamics. This finding is congruent with observations by Bacon et al. and Selvin et al. who reported synergistic effects of cardiometabolic comorbidity clusters on erectile function.[11]

Smoking demonstrated a trend toward significance (OR=2.18, p=0.075) that likely reflects insufficient statistical power to detect this association in a sample of 150 patients, given that the odds ratio is clinically meaningful. Published data consistently identify smoking as an independent risk factor for ED through mechanisms including accelerated endothelial ageing, impaired cavernosal smooth muscle relaxation, and pro-thrombotic effects on penile microvasculature.[12] A larger sample would likely yield statistical significance for this association. Alcohol use was not significantly associated with ED in our cohort, possibly owing to the relatively low proportion of heavy consumers.

The clinical implications of this study are significant. ED in a urology OPD population should not be viewed in isolation as a sexual health complaint; rather, it should be recognised as a potential sentinel event for subclinical or overt cardiometabolic disease. Screening all men presenting to urology OPD with a brief validated tool like the IIEF-5, particularly in the presence of DM or HTN, would facilitate early identification and holistic management. Integrated care pathways involving diabetology, cardiology, and urology should be considered for men presenting with moderate or severe ED and concurrent cardiometabolic risk factors.

5.1 Limitations

This study has several limitations that should be acknowledged. First, the cross-sectional design precludes causal inference. Second, the sample was recruited from a single tertiary care centre, potentially limiting generalisability to primary care or community settings. Third, duration and severity of DM and HTN were not systematically quantified, and the influence of specific antihypertensive or antidiabetic drug classes on ED was not analysed. Fourth, testosterone levels were not measured in all patients, and androgen deficiency as a confounder cannot be excluded. Fifth, the use of self-reported instruments introduces the possibility of social desirability bias, particularly in the Indian sociocultural context where sexual health is a sensitive domain. Future studies with larger, multi-centric samples incorporating hormonal profiling, psychosexual assessments, and penile duplex Doppler data would provide a more comprehensive characterisation of ED aetiology in this population.

6. CONCLUSION

Erectile dysfunction is a prevalent condition affecting nearly one in four men attending a tertiary care urology OPD, with moderate-grade dysfunction being the most common severity category. Diabetes mellitus and hypertension are independently and significantly associated with ED, with synergistic effects evident when both conditions coexist. Older age is a statistically significant independent predictor of ED. These findings highlight the importance of routine ED screening using validated tools such as IIEF-5 in all men presenting to

urology OPD, especially those with metabolic and cardiovascular comorbidities. Early identification facilitates timely intervention, improves quality of life, and may serve as an early warning for broader cardiometabolic disease.

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