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ERECTILE DYSFUNCTION IN MEN WITH BENIGN PROSTATIC HYPERPLASIA: PREVALENCE AND ASSOCIATION WITH LOWER URINARY TRACT SYMPTOM SEVERITY

Urology

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ABSTRACT

Objective: To determine the prevalence of erectile dysfunction (ED) in men with benign prostatic hyperplasia (BPH) and to evaluate the association between lower urinary tract symptom (LUTS) severity and erectile function. **Material & Methods:** This cross-sectional observational study included **126 men with BPH** presenting with LUTS. LUTS severity was assessed using the **International Prostate Symptom Score (IPSS)**, and erectile function was evaluated using the **International Index of Erectile Function–5 (IIEF-5)**. Clinical parameters including age, prostate size, digital rectal examination (DRE) grade, prostate-specific antigen (PSA), body mass index (BMI), and maximum urinary flow rate (Qmax) were recorded. Associations between LUTS severity and erectile dysfunction were analyzed using correlation analyses, chi-square testing, and multivariable logistic regression. **Results:** Erectile dysfunction (IIEF-5 <22) was present in **107 patients (84.9%)**, with **34.2%** exhibiting moderate-to-severe ED. Increasing LUTS severity was associated with progressively worse erectile function, demonstrating a significant dose–response relationship ($\chi^2 = 36.16$, $p < 0.001$). IPSS score showed a moderate negative correlation with erectile function ($r = -0.585$, $p < 0.001$) and remained an independent predictor of ED after adjustment for age (OR 1.22 per 5-point IPSS increase; 95% CI 1.09–1.37). Age demonstrated the strongest overall association with ED. Qmax was the only clinical parameter positively correlated with erectile function ($r = +0.383$, $p < 0.001$). The prevalence of ED increased progressively with higher DRE grades. **Conclusion:** Erectile dysfunction is highly prevalent among men with symptomatic BPH and is independently associated with LUTS severity. These findings support routine assessment of sexual function in men presenting with LUTS and suggest that greater symptom burden and anatomical disease severity identify patients at increased risk of erectile dysfunction.

KEYWORDS

Benign prostatic hyperplasia; Erectile dysfunction; Lower urinary tract symptoms; Sexual dysfunction

INTRODUCTION

Benign prostatic hyperplasia (BPH) is a common age-related condition affecting men worldwide and is a leading cause of lower urinary tract symptoms (LUTS) in the aging male population[1]. The prevalence of BPH and LUTS increases with advancing age, significantly impairing quality of life through symptoms such as urinary frequency, nocturia, weak stream, and incomplete bladder emptying. Erectile dysfunction (ED) is another highly prevalent condition in aging men and is frequently reported in patients with BPH. Both LUTS and ED share common risk factors—advancing age, vascular disease, and alterations in autonomic function—and accumulating epidemiological studies demonstrate a higher prevalence of ED among men with moderate to severe LUTS[2]. Over the past two decades, meta-analyses and large observational studies have confirmed a strong association between higher International Prostate Symptom Scores and worsening erectile function[2].

Several pathophysiological mechanisms have been proposed to explain the coexistence of LUTS and ED, including endothelial dysfunction with impaired nitric oxide signaling, chronic pelvic ischemia, increased adrenergic tone, and smooth muscle hyperactivity affecting both lower urinary tract and penile tissues[3] . However, the precise nature of this relationship-whether LUTS directly contributes to ED or simply reflects shared underlying pathology-remains debated. Most available data originate from Western populations, and there are limited region-specific data from South Asian and Indian cohorts, where sociocultural factors and healthcare access may differ.

This study was therefore conducted to determine the prevalence of erectile dysfunction in men with symptomatic BPH and to evaluate its association with LUTS severity (IPSS) and erectile function (IIEF-5). Additionally, we aimed to explore the relationship between erectile function and clinical parameters (age, prostate volume, PSA, DRE grade, Qmax) in an Indian hospital-based cohort.

Objective Of The Study

The objective of this study was to determine the prevalence of erectile dysfunction in men with benign prostatic hyperplasia and to evaluate its association with lower urinary tract symptom severity (IPSS) and selected clinical parameters including age, prostate volume, prostate-specific antigen, digital rectal examination findings, and maximum urinary flow rate (Qmax) in an Indian hospital-based cohort.

MATERIALS AND METHODS

Study Design And Setting

This was a hospital-based, single-center, cross-sectional observational study conducted in the Department of Urology, Regional Institute of Medical Sciences (RIMS), Imphal, from July 2023 to May 2025.

Study Population

All male patients aged ≥50 years presenting with lower urinary tract symptoms (LUTS) and subsequently diagnosed with benign prostatic hyperplasia (BPH) based on clinical evaluation were assessed for eligibility.

Inclusion Criteria

- o Male patients aged ≥50 years
- o Clinically diagnosed benign prostatic hyperplasia
- o Serum prostate-specific antigen (PSA) level <4 ng/ml
- o Willingness to provide informed consent

Exclusion Criteria

- o Patients with diabetes mellitus or hypertension (excluded to reduce confounding effects on erectile function)
- o Patients receiving medications known to affect sexual function, including alpha-blockers or antipsychotics.
- o History or clinical evidence of neurological disorders affecting bladder or sexual function
- o Patients unwilling or unable to complete the questionnaire or interview

Clinical Evaluation

All eligible patients underwent a detailed clinical evaluation including medical history, physical examination, digital rectal examination

(DRE), and focused neurological examination. Baseline investigations included serum PSA and ultrasonography of the kidney, ureter, and bladder (USG KUB), with prostate volume calculated using the ellipsoid formula. Maximum urinary flow rate (Qmax) was measured using uroflowmetry.

Assessment Of LUTS And Erectile Function

Severity of LUTS was assessed using the linguistically validated version of the International Prostate Symptom Score (IPSS). Erectile function was evaluated using the International Index of Erectile Function-5 (IIEF-5) questionnaire. Literate patients self-administered the questionnaires, while patients unable to do so were interviewed by a single trained investigator to minimize interviewer bias.

Sample Size And Sampling Method

All eligible patients presenting during the study period were included using a universal sampling method. Formal sample size calculation was not performed due to the exploratory nature of the study.

Outcome Variables

Primary outcome: Prevalence of erectile dysfunction in patients with BPH. Secondary outcomes: Association of erectile dysfunction with age, LUTS severity (IPSS), prostate volume, PSA level, DRE findings, and maximum urinary flow rate (Qmax).

Statistical Analysis

Data were analyzed using IBM SPSS Statistics version 26. Continuous variables were expressed as mean ± standard deviation or median (interquartile range) as appropriate. Categorical variables were expressed as frequencies and percentages. Associations between erectile dysfunction and clinical variables were analyzed using appropriate statistical tests. A p-value <0.05 was considered statistically significant.

Ethical Considerations

The study was approved by the Institutional Research Ethics Board of RIMS, Imphal. Written informed consent was obtained from all participants prior to enrollment. Confidentiality of patient data was strictly maintained.

RESULTS

Study Population

A total of **126 men with benign prostatic hyperplasia** were included in the final analysis. The mean age of the study population was **69.5 ± 6.8 years** (range 54–83 years). Patients predominantly had **moderate-to-severe lower urinary tract symptoms**, with a mean IPSS score of **21.8 ± 4.8**. The mean prostate volume was **62.4 ± 8.9 g**, mean PSA level was **2.92 ± 0.89 ng/mL**, and mean maximum urinary flow rate (Qmax) was **10.3 ± 2.3 mL/s**, reflecting a cohort with clinically significant bladder outlet obstruction. Baseline demographic and clinical characteristics are summarized in **Table 1**.

Table 1. Baseline Demographic And Clinical Characteristics (n = 126)

Variable	Mean ± SD	Range
Age (years)	69.5 ± 6.8	54–83
BMI (kg/m²)	22.4 ± 1.5	18.7–25.3
IPSS score	21.8 ± 4.8	14–35
IIEF-5 score	15.0 ± 5.0	6–24
Prostate size (g)	62.4 ± 8.9	42.8–90.0
PSA (ng/mL)	2.92 ± 0.89	1.1–3.9
Qmax (mL/s)	10.3 ± 2.3	5.0–14.6

Prevalence And Severity Of Erectile Dysfunction

Overall, **107 of 126 patients (84.9%)** had erectile dysfunction, defined as an IIEF-5 score <22. Only **19 patients (15.1%)** had normal erectile function. Among patients with erectile dysfunction, **moderate or severe ED** was present in **43 patients (34.2%)**, while **mild to mild–moderate ED** was observed in **64 patients (50.8%)**. The distribution of erectile dysfunction severity is shown in **Table 2**.

Table 2. Prevalence And Severity Distribution Of Erectile Dysfunction

ED category (IIEF-5)	n	%
No ED (≥22)	19	15.1
Mild ED (17–21)	32	25.4
Mild–Moderate ED (12–16)	32	25.4
Moderate ED (8–11)	36	28.6
Severe ED (<8)	7	5.6
Any ED (<22)	107	84.9

Association Between LUTS Severity And Erectile Dysfunction

A clear association was observed between LUTS severity and erectile dysfunction. Cross-tabulation of IPSS category and ED severity demonstrated a marked **dose–response relationship**. Among patients with **moderate IPSS**, the majority had no or mild erectile dysfunction, whereas patients with **severe IPSS** showed a substantial shift toward moderate-to-severe ED. Only **1.2%** of patients with severe IPSS had normal erectile function, compared with **43.9%** in the moderate IPSS group (**Table 3**).

Table 3. IPSS Category × ED Severity (Dose–Response Relationship)

ED Severity	Moderate IPSS (n=41)	Severe IPSS (n=85)
No ED	18 (43.9%)	1 (1.2%)
Mild ED	17 (41.5%)	15 (17.6%)
Mild–Moderate ED	1 (2.4%)	31 (36.5%)
Moderate ED	4 (9.8%)	32 (37.6%)
Severe ED	1 (2.4%)	6 (7.1%)

This association was statistically significant on chi-square testing ($\chi^2 =$ **36.16, p = 1.8 × 10**). In addition, a significant monotonic trend was demonstrated using Spearman rank correlation between IPSS category and ED severity (**ρ = 0.588, p < 0.001**).

Correlation And Linear Regression Analyses

Pearson correlation analysis demonstrated a **moderate negative correlation** between IPSS score and IIEF-5 score (**r = −0.585, p < 0.001**), indicating worsening erectile function with increasing LUTS severity. Linear regression analysis showed that each one-point increase in IPSS was associated with an approximate **0.6-point decrease in IIEF-5 score** (β = −0.612; 95% CI −0.72 to −0.50).

Age showed a **strong negative correlation** with erectile function (**r = −0.833, p < 0.001**), with regression analysis demonstrating a similar magnitude of effect (β = −0.621; 95% CI −0.71 to −0.54). These results are detailed in **Table 4**.

Table 4. Correlation And Linear Regression Of IPSS And Age With IIEF-5

Predictor	Pearson r	p-value	Regression slope (β)	95% CI
IPSS score	−0.585	<0.001	−0.612	−0.72 to −0.50
Age (years)	−0.833	<0.001	−0.621	−0.71 to −0.54

Multivariable Correlation Analysis

Correlation analysis of additional clinical parameters with erectile function is summarized in **Table 5**. Age exhibited the strongest negative association with IIEF-5 score, followed by PSA level and IPSS score. Qmax was the **only variable demonstrating a positive correlation** with erectile function (**r = +0.383, p < 0.001**), indicating better erectile function in patients with higher urinary flow rates. Prostate size and DRE grade showed weaker but statistically significant negative correlations, while BMI demonstrated no significant association with erectile function.

Table 5. Correlation Of Clinical Parameters With Erectile Function

Variable	r	p-value	Interpretation
Age	−0.833	<0.001	Strong negative
PSA	−0.643	<0.001	Moderate–strong negative
IPSS	−0.585	<0.001	Strong LUTS predictor
Qmax	0.383	<0.001	Protective association
Prostate size	−0.345	<0.001	Weak–moderate
DRE grade	−0.284	<0.01	Weak negative
BMI	0.015	NS	No association

Predictors Of Erectile Dysfunction: Logistic Regression

Binary logistic regression analysis was performed to identify independent predictors of erectile dysfunction (IIEF-5 <22). After adjustment, both IPSS score and age remained significant predictors of ED. Each **5-point increase in IPSS** was associated with a **22% increase in the odds of erectile dysfunction** (OR 1.22; 95% CI 1.09–1.37; p < 0.01), while each **decade increase in age** was associated with a **33% increase in ED odds** (OR 1.33; 95% CI 1.18–1.50; p < 0.001). These findings are presented in **Table 6**.

Table 6. Binary Logistic Regression Predicting Erectile Dysfunction (IIEF-5 < 22)

Predictor	OR	95% CI	p-value
IPSS (per 5 points)	1.22	1.09–1.37	<0.01
Age (per decade)	1.33	1.18–1.50	<0.001

Erectile Dysfunction Risk Stratification By DRE Grade

Risk stratification based on digital rectal examination grade demonstrated a progressive increase in erectile dysfunction prevalence with increasing DRE grade. Erectile dysfunction was observed in **71.4%** of patients with DRE grade 2, **95.6%** with grade 3, and **100%** of patients with grade 4. The proportion of moderate-to-severe ED increased correspondingly across grades (**Table 7**).

Table 7. Erectile Dysfunction Prevalence By DRE Grade

DRE Grade	No ED (%)	Mild ED (%)	Moderate–Severe ED (%)	Any ED (%)
Grade 2	28.6	34.3	37.1	71.4
Grade 3	4.4	26.7	68.9	95.6
Grade 4	0	23.9	76.1	100

DISCUSSION

Prevalence Of Erectile Dysfunction:

Erectile dysfunction was highly prevalent in our cohort of Indian men with symptomatic BPH (84.9% overall; 34.2% moderate-to-severe). This exceeds many community-based estimates (for example, 47.6% in NHANES BPH subsets[2]) but is comparable to hospital- and clinic-based series where ED rates in older men with advanced LUTS typically range 70–88%[2]. Our findings align closely with Lei et al. who reported 82.3% ED prevalence in Chinese LUTS patients , and with Kardasevic et al. who documented a strong inverse IPSS–IIEF correlation (Spearman ρ=−0.76) alongside rising ED prevalence with symptom severity .

A North Indian hospital study (Gyani et al.) found ~70% ED prevalence (aged ≥50) , but that cohort included diabetics and hypertensives, likely lowering the association. The higher ED prevalence in our study may reflect study design factors: exclusion of diabetes/hypertension to isolate LUTS-specific effects, an older mean age (69.5 years) with predominantly severe LUTS (mean IPSS 21.8), and hospital-based recruitment favoring significant obstruction (mean Qmax 10.3 mL/s). These enrich the sample for ED, explaining the upper-range prevalence. A comparative overview of the present study findings with previously published literature is summarized in Table 8.

Age and ED:

Our analysis showed a strong inverse correlation between age and erectile function (r=−0.833, p<0.001), consistent with age-stratified LUTS cohorts. Lei et al. found ED prevalence rising from 70.5% (age 50–59) to 97.7% (≥70) , and studies by Cayan et al. and Okafor et al. similarly demonstrated steep age-related increases in LUTS patients[1] [11]. In line with these, our 69.5-year-old cohort exhibited very high overall ED. We focused on correlation rather than age subgroups due to sample size, but our continuous analysis underscores that advancing age markedly increases ED risk even among men with LUTS.

Table 8. Comparative Table: LUTS -ED Association Studies

Study	Sample Size	Population/ Details	ED Prevalence	Moderate-Severe ED	Mean Age	FINDINGS
Current study (2025)	126	Indian BPH/LUTS hospital, no DM/HTN, mean IPSS 21.8	84.9% (IIEF-5 ≤22)	34.20%	69.5y	Severe LUTS dominant
Gyani et al (2025)	183	North Indian BPH ≥50y	~70%	Not specified	NR	Included DM/HTN; similar IPSS-ED link
Kardasevic et al (2017)	NR (prospective)	LUTS/BPH 40-60y	70% overall	Higher in severe IPSS	40-60y	IPSS inversely proportional to IIEF-5
Demir et al (2009)	NR	LUTS clinic patients	65-82% (severe LUTS)	50-60%	NR	Strong LUTS-ED association confirmed
Glina et al (2013)	1126 (Danish)	LUTS/BPH responders	Incidence 2.7-3.1x higher with LUTS	Not specified	NR	Dose-response with LUTS severity
El-Sakka (2005)	374	ED patients with LUTS	Significant association	Not specified	54.8y	LUTS linked to penile arterial insufficiency

Dose–response with LUTS:

We observed a pronounced dose–response between LUTS severity and ED. Severe LUTS virtually eliminated normal erectile function: only 1.2% of men with severe IPSS had no ED, versus 43.9% of those with moderate LUTS. This sharp escalation is clinically meaningful and mirrors previous data. Lei et al. reported no-ED rates of only 2.3% in severe LUTS patients . The Song et al. meta-analysis likewise found a pooled odds ratio >3 for sexual dysfunction in higher vs lower LUTS severity[2], supporting a graded effect. Our correlation (r=−0.585) and regression slope (≈−0.6 IIEF points per IPSS unit) quantitatively agree with prior reports, reinforcing IPSS as an independent ED predictor beyond age.

Independent Predictors:

In multivariable analysis, both LUTS severity and age remained significant predictors of ED. Every 5-point IPSS increase raised ED odds by 22%; each decade of life raised odds by 33%. This concurs with prior studies showing LUTS severity retains a significant ED association after adjusting for age[12]. It supports the concept that LUTS-related pathophysiology contributes directly to sexual dysfunction, not merely as an age surrogate[2]. Thus, in clinical practice, higher IPSS in younger men should raise suspicion of ED.

Correlations With Other Parameters:

Age was the strongest overall correlate of ED, as expected. Notably, PSA and IPSS were also inversely correlated with IIEF-5. Prostate volume and DRE grade showed weaker negative correlations. Interestingly, maximum flow rate (Qmax) correlated positively with erectile function (r=+0.383, p<0.001): men with preserved urinary flow had better erectile function, possibly reflecting less severe obstruction and downstream ischemia. While this novel finding warrants confirmation, it is biologically plausible and suggests that impaired urinary dynamics may parallel vasculogenic impairment.

Management Implications:

Given the high prevalence, LUTS/BPH patients should be routinely screened for ED during evaluation. For treatment, combination therapy may offer synergistic benefits: meta-analysis data indicate that combining alpha-blockers with PDE5 inhibitors improves both IPSS and IIEF scores more than monotherapy[13]. Our findings also support focusing on modifiable factors; for example, addressing bladder outlet obstruction may have downstream benefits for erectile function. Major urology guidelines now endorse assessing sexual function in men with LUTS/BPH, advocating integrated management of urinary and sexual symptoms[1] [1] .

Strengths And Limitations:

Strengths of this study include use of validated IPSS and IIEF-5 instruments, deliberate exclusion of metabolic confounders (diabetes, hypertension), and comprehensive multivariable analysis adjusting for age. Our cohort reflects real-world practice in a Northeast Indian tertiary center, a region with few prior data. Limitations include the cross-sectional design (precluding causality), single-center recruitment (selection bias toward symptomatic patients), and lack of detailed comorbidity or hormonal data. We also did not have premorbid ED history or partner factors. The modest sample size (n=126) may limit generalizability.

Future Directions:

Longitudinal studies are needed to clarify whether effective LUTS treatment (medical or surgical) can favorably modify ED trajectories. Mechanistic research incorporating hemodynamic and endothelial assessments could elucidate the shared pathways linking BPH and ED. Multicenter trials of combination therapies (α-blockers + PDE5 inhibitors, 5α-reductase inhibitors + PDE5 inhibitors) in LUTS/ED cohorts would inform integrated care strategies. Finally, more population-based data from South Asia are essential to understand regional risk patterns and influences on sexual health.

CONCLUSION

Erectile dysfunction is highly prevalent (84.9%) among men with symptomatic benign prostatic hyperplasia in this Indian tertiary-care cohort and shows a clear dose–response relationship with LUTS severity, independent of age. These results align with prior reports (Lei et al. 82.3% prevalence; Kardasevic et al. strong IPSS–IIEF inverse correlation) and meta-analytic findings (Song et al. OR≈3.3 for severe LUTS²), as well as age-stratified data approaching 100% ED in men ≥70 with severe LUTS[1] [11]. Simple clinical assessments (IPSS score, Qmax, DRE grade) identified patients at very high ED risk. Overall, our findings support routine evaluation of sexual function in men presenting with LUTS and reinforce the need for integrated management of urinary and sexual symptoms to optimize patient outcomes. Further longitudinal research is warranted to establish causality and to determine whether targeted LUTS interventions can improve erectile function over time.

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