Correlation of International Prostate Symptom Score and uroflowmetry parameters in patients with benign prostatic hyperplasia in Western Nepal

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ABSTRACT

Introduction: The relationship between subjective symptom scores and objective uroflowmetric parameters in benign prostatic hyperplasia (BPH) is still being discussed, and data from South Asia, particularly Nepal, remain sparse. This study sought to ascertain the correlation between the International Prostate Symptom Score (IPSS) and uroflowmetry parameters like maximum flow rate (Qmax) and average flow rate (Qave) in men with BPH attending a tertiary care center in Western Nepal. **Methods:** This is a hospital based, prospective cross-sectional study which enrolled 92 consecutive men aged ≥40 years with lower urinary tract symptoms (LUTS) secondary to benign prostatic hyperplasia (BPH). Ethical committee approval and informed written consent were obtained. IPSS was administered with assistance where necessary due to low literacy. Data were coded and entered using Microsoft Excel version 2010 and transferred into SPSS Version 25 for analysis. **Results:** The median age was 70 years. The mean IPSS was 22.86 ± 5.82, with 71.7% of patients having severe symptoms. The median Qmax was 11.5 ml/s, and Qave was 6.0 ml/s. Spearman's correlation revealed a weak, non-significant negative correlation between IPSS and Q max ($\rho = -0.139$, $p = 0.186$) and between IPSS and Qave ($\rho = -0.132$, $p = 0.210$). **Conclusions:** In this cohort from Western Nepal, there was no significant correlation between subjective symptom severity and objective uroflowmetric parameters. IPSS and Qmax assess different aspects of BPH and should be utilized as complementary instruments rather than interchangeable substitutes.

Keywords: International prostate symptom score, uroflowmetry.

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INTRODUCTION

Lower urinary tract symptoms (LUTS) represent one of the most prevalent age-related clinical conditions affecting the ageing male population worldwide. These symptoms—which include urinary frequency, urgency, nocturia, decreased force of stream, intermittency, straining, and sensation of incomplete emptying—are most commonly attributable to benign prostatic hyperplasia (BPH).[1] The burden of LUTS extends well beyond physical morbidity; unlike other chronic illnesses like diabetes mellitus and hypertension, LUTS significantly impairs functioning and has a disproportionately greater negative impact like anxiety and depression.[2] The prevalence of BPH is very age-dependent, increasing from about 8% in men in their fifth decade to almost 90% in those over 80.[3] The clinical and economic effect of BPH is growing due to the accelerating global ageing trajectory, which highlights the critical need for easily accessible, trustworthy, and culturally sensitive screening instruments in a variety of healthcare settings.[4]

The gold standard subjective tool for assessing the severity of LUTS

and tracking therapy progress is the International Prostate Symptom Score (IPSS). The IPSS is based on the American Urological Association (AUA) symptom index, which was first described by Barry and colleagues in 1992. It consists of seven questions that address four voiding symptoms (poor stream, intermittency, straining, incomplete emptying), three storage symptoms (frequency, urgency, nocturia), and quality-of-life (QOL) question.[5,6] Each symptom is scored from 0 to 5, yielding a total score ranging from 0 to 35, while the QOL item is scored separately from 0 to 6. Symptom severity is categorized conventionally as mild (IPSS 0–7), moderate (IPSS 8–19), or severe (IPSS 20–35).[5] IPSS has several clinical uses outside of initial diagnosis, such as treatment stratification, long-term monitoring, and patient counselling.[5,7] However, the IPSS remains inherently subjective, influenced by cultural perceptions of urinary symptoms, health literacy, recall bias, and individual variations in symptom tolerance.

Uroflowmetry offers an objective, non-invasive, and affordable assessment of voiding dynamics in addition to subjective symptom assessment. Quantitative characteristics such as maximum flow rate (Qmax), average flow rate (Qave), voided volume, voiding time, flow duration, and time to maximum flow are generated by uroflometry analysis.[5] In order to guarantee accurate and repeatable uroflowmetry tracings, the International Continence Society suggests a minimum voided volume of 150 ml.[6]

There is a scarcity of regional data from South Asia, and no published study has particularly looked at this correlation in the population of Western Nepal. While prior Nepalese studies, such as those by Gupta et al.[8], have evaluated clinical correlations in other regions of the country, verifying these patterns remains a geographic necessity for Western Nepal, where distinct socioeconomic and literacy profiles exist. Clinicians cannot assume that foreign or centralized baseline data accurately indicate bladder outlet obstruction (BOO) in Western Nepalese men without local verification. This information gap has direct implications for resource allocation and diagnostic accuracy. In order to ascertain the relationship between IPSS results and uroflowmetry parameters in consecutive men who presented with LUTS owing to BPH at a tertiary care center in Western Nepal, this study was conducted.

METHODS

This hospital based, prospective cross-sectional study was conducted from November 4, 2025 to April 3, 2026 in the Department of Urology at Gandaki Medical College and Teaching Hospital, a tertiary care teaching hospital in Pokhara, Western Nepal.

The study population comprised consecutive male patients presenting with lower urinary tract symptoms (LUTS) at the urology outpatient department. Patients were enrolled consecutively to minimize selection bias. Inclusion criteria were men aged 40 years or older with clinical diagnosis of benign prostatic hyperplasia (BPH) based on digital rectal examination (DRE) and transabdominal ultrasonography. Exclusion criteria were hematuria, suspected prostate carcinoma, bladder calculi, urethral stricture, urinary tract infection (UTI), renal insufficiency, use of medications interfering with bladder function, and prior medical therapy for BPH.

The primary subjective measure of symptom burden was the IPSS. Objective uroflowmetric parameters included maximum flow rate (Q max), average flow rate (Qave), and total voided volume (VV). Demographic and clinical data including age, prostate volume estimated via transabdominal ultrasonography, and post-void residual urine (PVRU) were recorded as potential confounders. All data were recorded in a standardized Case Record Form (CRF).

Each patient underwent a standardized clinical evaluation comprising a comprehensive medical history, general physical examination, and digital rectal examination (DRE). Transabdominal ultrasonography was performed to estimate prostate volume and exclude bladder calculi, significant post-void residual, or other lower urinary tract pathology. Serum prostate-specific antigen (PSA) was measured when indicated to exclude prostate carcinoma. Urine microscopic examination was performed to rule out active infections.

The IPSS questionnaire, which comprises seven questions addressing storage symptoms (frequency, urgency, nocturia) and voiding symptoms (poor stream, intermittency, straining, incomplete emptying), was administered to all participants. Each symptom was scored from 0 to 5, yielding a total score ranging from 0 to 35. Symptom severity was categorized as mild (0–7), moderate (8–19), or severe (20–35). A single quality of life (QOL) question was scored separately from 0 (delighted) to 6 (awful).

Given the low literacy rates prevalent in Western Nepal, patients were invited to complete the questionnaires with assistance from physician when necessary. This assisted administration approach was adopted to ensure comprehension and data completeness.

Uroflowmetry was performed using Flow Comp NG wireless Uroflowmetry system. Patients were instructed to void only

when they experienced a strong urge to void, minimizing voluntary deferral or straining. Only voided volumes of 150 ml or greater were included for analysis, in accordance with International Continence Society recommendations.[9]

Data obtained from the case record forms and questionnaires were entered into Microsoft Excel version 2010 and analyzed using the Statistical Package for the Social Sciences (SPSS) version 25 (IBM Corp, Armonk, New York, USA).

Descriptive statistics were computed for all variables. Continuous variables were expressed as mean and standard deviation (SD) if normally distributed, or as median with interquartile range (IQR) if non-normally distributed. Normality was assessed using the Shapiro-Wilk test. Categorical variables were summarized as frequencies and percentages.

Given the non-normal distribution of most uroflowmetric parameters as confirmed by the Shapiro-Wilk test ($p < 0.01$), correlations between IPSS and uroflowmetry parameters were analyzed using Spearman's rank correlation coefficient (ρ). A p-value <0.05 was considered statistically significant. All tests were two-tailed. A total of 92 patients with complete data were included in the final analysis.

Ethical approval was obtained from the Institutional Ethics Committee of Gandaki Medical College and Teaching Hospital (Ref. No. 38/082/083) prior to study initiation. Participation was entirely voluntary. All participants were recruited only after providing written informed consent. The study was conducted in accordance with the Declaration of Helsinki.

RESULTS

A total of 92 patients with complete data were included in the final analysis. The median age was 70 years. The age distribution is shown in (Figure 1A). The age group of 70-79 years old accounted for the largest percentage of patients (41.30%), followed by 60–69 years (33.7%), 50–59 years (13.0%), >80 years (10.9%), and 40–49 years (1.1%).

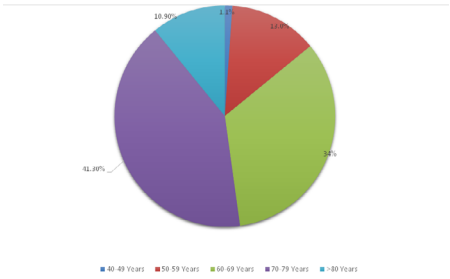

Figure 1A: Pie chart showing the distribution of age groups among 92 BPH patients.

Clinical Characteristics

The mean total International Prostate Symptom Score (IPSS) was 22.86 ± 5.82), indicating predominantly moderate-to-severe symptom burden. The distribution of IPSS severity categories is shown in Figure 1B. According to IPSS classification, patient (1.1%) had mild symptoms (IPSS 1–7), 25(27.2%) had moderate symptoms (IPSS 8–19), and 66(71.7%) had severe symptoms (IPSS 20–35). The median quality of life (QOL) score was 5.0 (IQR 4–6).

Uroflowmetry parameters showed a median maximum flow rate (Qmax) of 11.5 ml/s (IQR 9–14), median average flow rate (Qave) of 6.0 ml/s (IQR 4–7), and median voided volume of 233 ml (IQR 195–335). Normality testing (Shapiro-Wilk) confirmed normal distribution for IPSS ($p=0.570$) but non-normal distribution for all other continuous variables: Qmax ($p<0.001$), Qave ($p=0.001$), voided volume ($p<0.001$), and QOL ($p<0.001$). Accordingly, parametric and non-parametric tests were done.

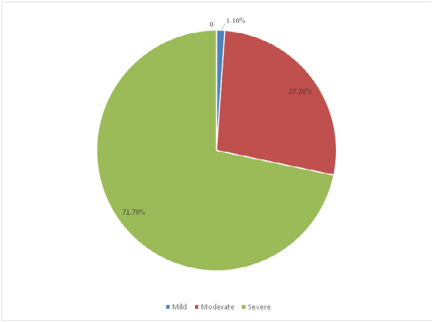

Figure 1B: Pie chart showing the distribution of IPSS severity categories. Severe symptoms (IPSS 20–35) accounted for 66(71.7%) patients, moderate symptoms (IPSS 8–19) for 25(27.2%), and mild symptoms (IPSS 1–7) for 1(1.1%).

Table 1: Baseline Characteristics (N= 92)

Characteristics	Value
Age (years), median (IQR)	**70 (62–76)**
Age group, n (%)	
40–49	1(1.1%)
50–59	12(13.0%)
60–69	31(33.7%)
70–79	38(41.3%)
>80	10(10.9%)
IPSS total score, mean ± SD*	22.86 ± 5.82)
IPSS severity category, n(%)	
Mild (1–7)	1(1.1%)
Moderate (8–19)	25(27.2%)
Severe (20–35)	66(71.7%)
QOL score, median (IQR)	5.0(4–6)
Qmax (ml/s), median (IQR)	11.5(9–14)
Qave (ml/s), median (IQR)	6.0 (4–7)
Voided volume (ml),median (IQR)	233 (195–335)

Correlation Analysis

Spearman's rank correlation was used to assess relationships between IPSS and uroflowmetry parameters,

given the non-normal distribution of most variables. There was a moderate positive correlation between IPSS and QOL (ρ = 0.544, p<0.001), indicating that higher symptom scores were associated with poorer quality of life.

No significant correlation was observed between IPSS and Qmax (ρ = –0.139, p = 0.186) or between IPSS and Qave (ρ = –0.132, p = 0.210). As expected, Qmax and Qave were strongly positively correlated (ρ = 0.836, p<0.001). Voided volume showed moderate positive correlations with both Qmax (ρ = 0.577, p<0.001) and Qave (ρ = 0.559, p<0.001).

Table 2: Spearman's Rank Correlation Coefficients (ρ) between clinical parameters

Variable pair	P	95% CI	p-value
IPSS – QOL	0.544	0.375 to 0.680	<0.001*
IPSS – Qmax	–0.139	–0.334 to 0.067	0.186
IPSS – Qave	–0.132	–0.327 to 0.074	0.210
IPSS – Voided volume	0.017	–0.188 to 0.221	0.869

*p value <0.05 denotes statistical significance

DISCUSSION

The International Prostate Symptom Score (IPSS) and maximum flow rate (Qmax) showed a weak, non-significant negative correlation (ρ =–0.139, p =0.186) in this study of 92 patients with benign prostatic hyperplasia (BPH) from Western Nepal. This suggests that higher symptom severity was not significantly linked to lower Qmax in this cohort. Similarly, there were no significant relationships between IPSS and voided volume (ρ = 0.017, p =0.869) or average flow rate (Qave) (ρ = –0.132, p=0.210). The median Qmax was 11.5 mL/s (IQR 9–14) and the mean IPSS was 22.86 (SD 5.82), indicating that the typical patient presents with moderate to severe symptoms and equivocal obstruction.

The patient□s median age was 70 years (IQR 62–76), which is in line with BPH populations that have been documented worldwide. The mean age was 64.71 years in a Nigerian study by Abhulimen et al.[5], similarly it was 58.07 years in a Turkish study conducted by Keskin et al.[10] and 69.1 years in a Indian study by Anilkumar et al.[11] The slightly older age in our cohort (median 70 years) may reflect delayed healthcare seeking behavior in Western Nepal, where access to urology services is limited and patients often present at more advanced ages. The proportion of patients with severe symptoms (IPSS 20–35) in our cohort was 66(71.7%), which is substantially higher than reported in many international series like in a Nigerian study reported severe symptoms in 65% of patients.[5] The high prevalence of severe symptoms in our cohort likely reflects a combination of factors: advanced age, delayed presentation, lack of primary care screening, and the tertiary care referral pattern where only the most symptomatic patients reach a urology center.

The median Qmax in our cohort (11.5 ml/s, IQR 9–14) is comparable to or slightly higher than other studies despite the high symptom burden. The Nigerian study reported a mean Qmax of 12.07 ml/s (SD 6.65),[5] and the Turkish study reported a mean Qmax of 17.5 ml/s (SD 6.8).[10] An Indian study by Anilkumar et al.[11] reported a mean Qmax of 9.26ml/s. Our finding of preserved Qmax (median 11.5 ml/s) in the context of severe symptoms (71.7%) suggests that many patients in Western Nepal may have non-obstructive causes of their symptoms, such as detrusor over activity or age-related detrusor underactivity, rather than pure bladder outlet obstruction.

The median voided volume in our cohort (233 ml, IQR 195–335) is within the range reported internationally. A Nigerian study by Oranusi et al.[12] reported a mean voided volume of 193 ml, while a study by Kohler et al.[13] reported median voided volume 305ml. Our median of 233 ml is therefore representative of standard clinical populations. The median QOL score of 5.0 (IQR 4–6) indicates that patients in our cohort are mostly dissatisfied to unhappy with their urinary symptoms, which aligns with the high IPSS and suggests substantial negative impact on daily life.

The correlation between IPSS and maximum urinary flow rate (Qmax) was weak and not statistically significant (p = –0.139, 95% CI: –0.334 to 0.067; p = 0.186). Although a negative trend was observe suggesting that higher symptom scores may be associated with lower flow rates but this relationship did not reach statistical significance. Similar correlation was observed in another Nepali study conducted by Gupta et al.[8]In contrast other study like those in Nigeria by Oranushi et al.[12] and Abhulimen et al.[5] and Singla et al.[14] in India which showed negative relation between IPSS and Qmax. The poor correlation in our population could be explained by a number of reasons. First, it appears that many patients with high symptom burdens do not have proportionate flow reduction given the high prevalence of severe symptoms (71.7%) and preserved Qmax (median 11.5 ml/s).

Similarly, the relationship between IPSS and average urinary flow rate (Qave) was weak negative and statistically non-significant (ρ = –0.132, 95% CI: –0.327 to 0.074; p = 0.210). Similar finding was observed by Gupta et al.[8] However many studies like those conducted by Abhulimen et al.[5] and Oranusi et al.[12] in Nigeria and Girman et al.[15] in America showed significant negative correlation of IPSS

with Qave. The absence of a meaningful correlation further emphasizes the discordance between patient-reported symptoms and objective measures of urinary flow. These results suggest that average flow rate, like Qmax, may not adequately capture the subjective experience of LUTS severity.

The combination of IPSS and uroflowmetry continues to be the mainstay of BPH evaluation in a resource-constrained environment such as Western Nepal, where urodynamic equipment is uncommon. Subjective symptom scores may not be a reliable indicator of objective obstruction in this cohort, as evidenced by the poor and non-significant correlation between IPSS and Qmax ($p = -0.139$, $p = 0.186$).

Even though the flow rates are relatively stable, a large number of patients (71.7%) have severe symptoms and a median QOL score of 5.0 (IQR 4–6), which shows that the disease is very burdensome and bothersome. In practical terms, one cannot assume that a patient with an IPSS >20 has a significant obstruction. Conversely, a patient with a low Qmax may not present any symptoms. A high IPSS with a stable Qmax, for example, could make us think of other problems like detrusor underactivity, hyperactive bladder, or even prostate cancer. In the absence of pressure-flow research, clinical judgment must meticulously incorporate both characteristics.

In Western Nepal, where a significant portion of the aging population faces literacy barriers, many patients are unable to complete the IPSS questionnaire independently. Consequently, the majority of our participants were assisted by trained medical staff who read each question out loud and documented the responses. While this method is highly reliable for data completeness, it introduces potential risk of interviewer bias. Furthermore, these patients may underreport their urinary symptom severity due to their shared cultural belief that voiding dysfunction is a normal consequence of aging. Both confounding tendencies could inherently weaken the true underlying correlation.

CONCLUSIONS

In this Western Nepalese cohort of men with BPH, subjective symptom severity as measured by the IPSS did not correlate significantly with objective uroflowmetric parameters (Qmax and Qave). Clinicians in resource-limited settings should use both tools complementarily rather than relying on one as a surrogate for the other. The high prevalence of severe symptoms despite equivocal flow rates suggests that non-obstructive voiding dysfunctions may be common in this elderly population.

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AUTHORS' CONTRIBUTIONS

SS designed the research, collected data, performed statistical analysis and interpretation. HBKC, SB, AB and BB contributed in literature review, data analysis and manuscript preparation. All authors read and approved manuscript.

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