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Correlation between Symptom Score of Obstructive Voiding and Flowmetry: A Clinical Study of 100 Cases

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Abstract

Introduction: *Uroflowmetry is a simple, noninvasive test that electronically measures urine flow rate during voiding. The International Prostate Symptom Score (IPSS) is the recommended symptom scoring tool for baseline assessment of symptom severity in men with obstructive voiding. Objective: To evaluate the relation between IPSS score and uroflowmetry parameters to understand the precise diagnostic manifestation of bladder outlet obstruction (BOO).*

Methodology: *This cross-sectional observational study was conducted at the Department of Urology, BIRDEM General Hospital, Dhaka, Bangladesh, from 26 March 2021 to 21 July 2022. A total 100 patients with clinical features of BOO were enrolled in this study purposively. Data were analyzed using MS Office and SPSS version 24.0.*

Results: *The mean age of patients was 59.15±9.75 years (range: 40–80), with 67% aged 50–69. Most had prostate disease (80%) and diabetes (70%). The mean IPSS score was 14.09±7.29 (4–35), with moderate (54%), mild (29%), and severe (17%) symptoms. Uroflowmetry revealed Qmax (12.91±6.81 mL/s), Qave (5.20±3.13 mL/s), and VV (166.55±46.37 mL). Voiding time, flow time, and Tmax were 38.38±11.72, 37.67±10.51, and 8.72±2.79 s, respectively. IPSS correlated strongly with flow parameters ($p<0.001$), and older age/DM significantly associated with BOO severity ($p<0.001$).*

Conclusion: *Uroflowmetry parameters showed a significant correlation with IPSS scores, reinforcing their clinical utility in assessing BOO severity. However, larger multicenter studies are recommended to validate these findings and enhance generalizability.*

Keywords: *Flowmetry, I-PSS score, Obstructive, Symptom score, Uroflowmetry,*

1. Introduction

The International Prostate Symptom Score (IPSS) is frequently used in both the initial diagnosis of LUTS patients and follow-up assessment of therapy efficacy[1]. Uroflowmetry serves as a non-invasive diagnostic tool for evaluating LUTS [2]. For decades, the IPSS questionnaire has been instrumental in assessing LUTS severity and related conditions [3]. Uroflowmetry has been incorporated into the diagnostic workup for benign prostatic hyperplasia (BPH) [4].

While neither IPSS nor uroflowmetry constitutes a diagnostic test for BPH itself, uroflowmetry provides valuable information about obstruction severity caused by benign prostatic enlargement

(BPE) [4]. Their combined use enhances sensitivity for detecting bladder outflow obstruction (BOO) secondary to prostatic hypertrophy [4]. The global burden of lower urinary tract symptoms is substantial, affecting an estimated 2.3 billion people (45.8% of the population) in 2018, representing an 18.4% increase since 2008 [5]. In the United States, BPH/LUTS affects over 20% of men aged 30-79 (approximately 15 million individuals), with prevalence escalating to 80% by age 70 [6]. Population studies demonstrate that 72.3% of men and 76.3% of women experience LUTS at least occasionally, while 47.9% of men and 52.5% of women report frequent symptoms [7]. Benign prostatic enlargement affects 50% of men with BPH and contributes to LUTS development [8]. The diagnostic process for BPH/LUTS involves multiple steps due to varying clinical presentations and definitions [9]. LUTS are classified as:

- Storage symptoms (frequency, urgency, nocturia)
- Voiding symptoms (straining, weak stream, incomplete emptying) [9]

Many patients delay seeking treatment until symptoms significantly impair quality of life [10], despite the established benefits of early intervention for preventing complications [9]. The IPSS has been primarily utilized for assessing LUTS in male populations, though limited applications exist for women [11]. As the current international standard, the IPSS evaluates seven key symptoms through questions that constitute the American Urologic Symptom Index (AUA-SI) [12]. The scoring system assesses:

- Voiding symptoms (incomplete emptying, intermittency, weak stream, straining)
- Storage symptoms (frequency, urgency, nocturia) [13]

The IPSS can be further subdivided into voiding (IPSS-V) and storage (IPSS-S) subscores for more detailed analysis [14]. Uroflowmetry objectively measures urinary flow rates during voiding, though, like IPSS, its findings are nonspecific for particular symptoms [15]. For definitive diagnosis of BOO, urodynamic studies remain the gold standard investigation [15].

2. Methodology

This cross-sectional observational study was conducted at the Department of Urology, BIRDEM General Hospital, Dhaka, Bangladesh, from March 2021 to July 2022. A total of 100 purposively selected patients with clinical features of bladder outflow obstruction (BOO) were enrolled after obtaining ethical approval and informed written consent. Inclusion criteria comprised patients presenting with BOO symptoms, while exclusion criteria excluded those with indwelling catheters, congenital BOO anomalies, neurogenic bladder, overactive bladder, high-pressure bladder, or withdrawn consent. Data were analyzed using MS Office and SPSS (version 24.0), with uroflowmetry and IPSS scores employed to assess obstruction severity and symptom profiles. The p-value <0.05 was considered as the indicator of significance.

3. Result

The study population (n=100) had a mean age of 59.15±9.75 years (range: 40-80), with 67% aged 50-69 years. Comorbidities were prevalent, including diabetes mellitus (70%) and prostate diseases (80%). The mean IPSS score was 14.09±7.29 (range: 4-35), with symptom severity distributed as moderate (54%), mild (29%), and severe (17%). Uroflowmetry parameters showed a mean Qmax of 12.91±6.81 mL/s, Qave of 5.20±3.13 mL/s, voided volume of 166.55±46.37 mL, voiding time of 38.38±11.72 seconds, flow time of 37.67±10.51 seconds, and Tmax of 8.72±2.79 seconds.

Severe BOO showed significant associations with older age (47.06% ≥70 years' vs 7.41% moderate and 0% mild), diabetes (94.12% vs 92.59% and 13.79%), and prostate diseases (100% vs 79.63% and 68.97%) (all $p<0.05$). Uroflowmetry parameters differed significantly by BOO severity ($p<0.001$), with severe cases showing the lowest voided volume (109.11±9.55 mL vs 152.77±19.85 moderate and 225.86±28.13 mild), poorest flow rates (Qmax 4.06±1.75 mL/s vs 11 and 21.65; Qave 1.96±0.38 vs 3.93 and 9.47), and longest durations (voiding time 56.41±5.44 sec vs 40.26 and 24.31; flow time 52.23±2.81 vs 40.26 and 24.31; Tmax 13.05±1.35 vs 9.11 and 5.45). Correlation analysis revealed strong positive relationships between IPSS and voiding time (r=+0.962), flow time (r=+0.934), and Tmax (r=+0.966), along with significant negative correlations with Qmax (r=-0.931), Qave (r=-0.855), and voided volume (r=-0.904), all with $p<0.001$.

These findings demonstrate clear associations between symptom severity, clinical characteristics, and objective uroflowmetry measures in BOO patie

Table 1. *Age distribution of patients (N=100)*

Age (Years)	n	%
<50 Yrs.	21	21.0%
50-59 Yrs.	31	31.0%
60-69 Yrs.	36	36.0%
≥70 Yrs.	12	12.0%

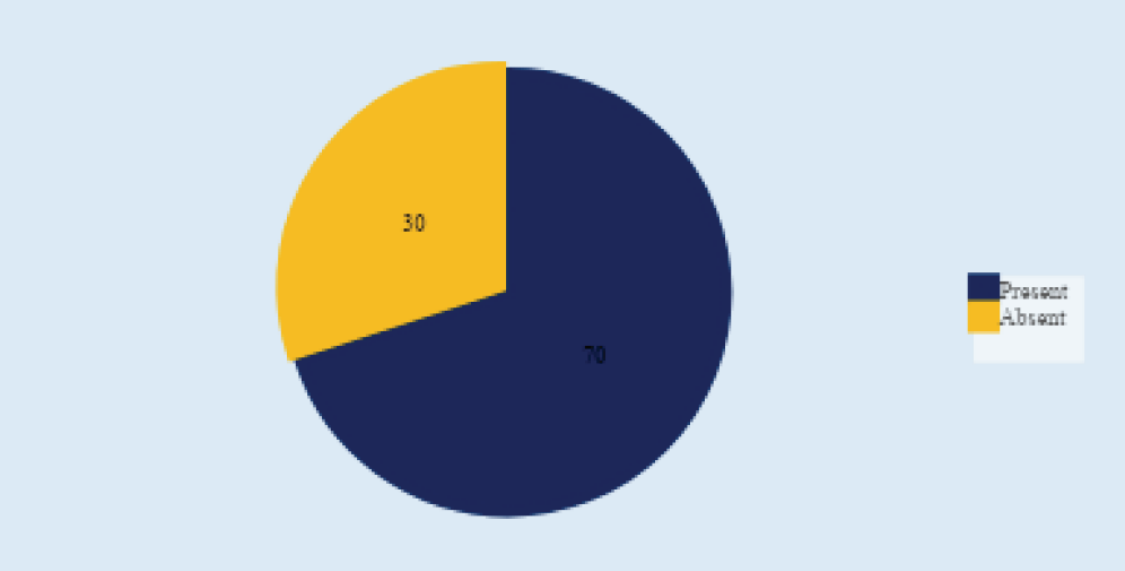

Figure 1. *Pie chart showed Prevalence of DM among study patients (N=100)*

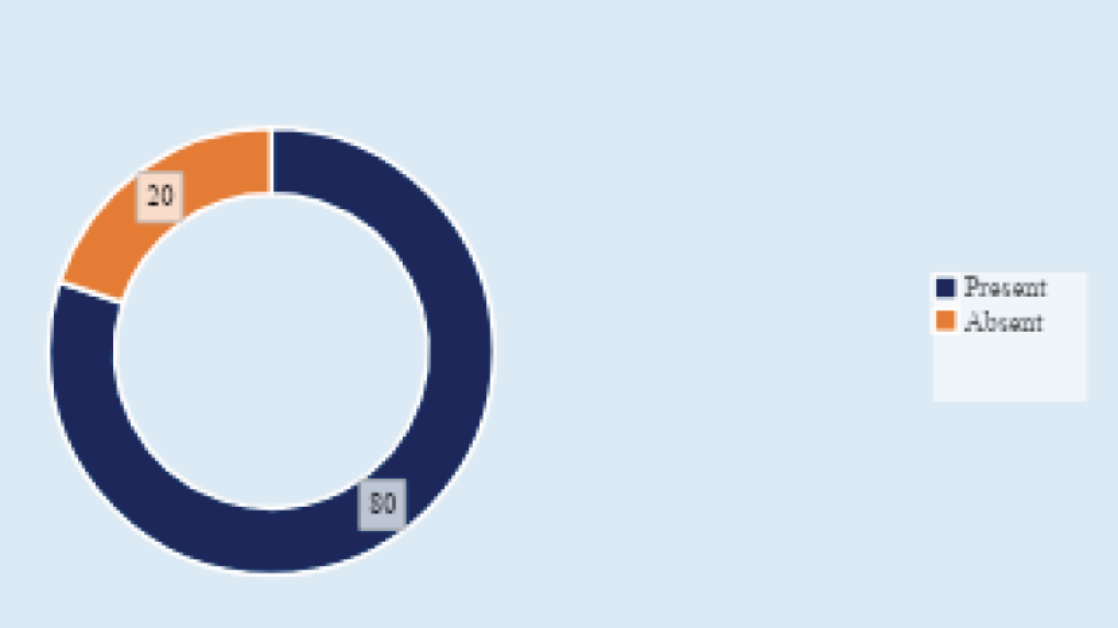

Figure I1. *Ring chart showed prevalence of prostate diseases among study patients (N=100)*

Table 2. *Severity of bladder outlet obstruction (BOO) patients according to I-PSS score (N=100)*

Severity	n	Mean ±SD	Range
Mild (0-7)	29	6.06±0.96	4-7
Moderate (8-19)	54	14.67±3.33	8-19
Severe (20-35)	17	25.94±4.93	20-35
Total	100	14.09±7.29	4-35

Table 3. *Uroflowmetry profile of study patients (N=100)*

Variables	Mean ±SD	Range
Voided volume (VV, in mL)	166.55±46.37	100-275
Maximum flow rate (Qmax, in mL/sec)	12.91±6.81	2.10-27.10

Average flow rate (Qave, in mL/sec)	5.20±3.13	1.67-13.50
Voiding time (in seconds)	38.38±11.72	20-63
Flow time (in seconds)	37.67±10.51	20-56
Time to maximum flow rate (T_{max}, in seconds)	8.72±2.79	4-15

Table 4. *Association of different factors with severity of BOO according to I-PSS score (N=100)*

Variables	**Mild**	**Moderate**	**Severe**
	n=29	n=54	n=17
	N (%)	N (%)	N (%)
Age in years (p<0.001)			
<50	11 (37.93)	8 (14.81)	2 (11.76)
50-59	15 (51.72)	14 (25.93)	2 (11.73)
60-69	3 (10.34)	28 (51.85)	5 (29.41)
≥70	0 (0)	4 (7.41)	8 (47.06)
Mean ±SD	49.93±6.02	61.24±7.38	68.24±9.42
Residence (p=0.668)			
Urban	16 (55.17)	35 (64.81)	11 (64.71)
Rural	13 (44.83)	19 (35.19)	6 (35.29)
DM (p<0.001)			
Yes	4 (13.79)	50 (92.59)	16 (94.12)
No	25 (86.21)	4 (7.41)	1 (5.88)
Prostate disease (p=0.04)			
Yes	20 (68.97)	43 (79.63)	17 (100)
No	9 (31.03)	11 (20.37)	0 (0)

Table 5. *Association of uroflowmetry parameters with severity of BOO as per I-PSS score (N=100)*

Parameters	**Mild**	**Moderate**	**Severe**	**p value**
	n=4	**n=4**	**n=6**	
VV (in mL)	225.86±28.13	152.77±19.85	109.11±9.55	<0.001
Qmax (in mL/sec)	21.65±2.77	11±3.31	4.06±1.75	<0.001
Qave (in mL/sec)	9.47±2.04	3.93±1.03	1.96±0.38	<0.001
Voiding time (in seconds)	24.31±2.45	40.26±5.31	56.41±5.44	<0.001
Flow time (in seconds)	24.31±2.45	40.26±5.31	52.23±2.81	<0.001
Time to maximum flow rate (T_{max}, in seconds)	5.45±0.78	9.11±1.27	13.05±1.35	<0.001

Table 6. *Correlation between I-PSS and uroflowmetry parameters in BOO patients (N=100)*

Test components	**Correlation (r-value)**	**R^2**	**p value**
IPSS/voided volume	-0.904	0.817	<0.001
IPSS/Qmax	-0.931	0.867	<0.001
IPSS/Qave	-0.855	0.731	<0.001
IPSS/voiding time	0.962	0.925	<0.001
IPSS/flow time	0.934	0.872	<0.001
IPSS/T_{max}	0.966	0.933	<0.001

4. Discussion

The mean IPSS score was 14.09±7.29 (range: 4-35), with symptom severity distributed as moderate (54%), mild (29%), and severe (17%). These findings align with Oranusi et al. (58.8% moderate, mean IPSS 13.5) and Romero et al. (44.9% moderate, mean IPSS 10) [4,16], though other studies report higher severe symptom prevalence [17,18].

The lower mild symptom frequency in our cohort may reflect patients' tendency to attribute urinary symptoms to aging, delaying presentation until symptoms become bothersome. Uroflowmetry revealed obstructive patterns with mean Qmax (12.91 mL/s) and Qave (5.20 mL/s). Severe BOO showed significantly poorer flow rates (Qmax 4.06 mL/s, Qave 1.96 mL/s) versus moderate (11.00, 3.93) and mild cases (21.65, 9.47), corroborated by strong negative IPSS correlations (Qmax r=-0.931; Qave r=-0.855). This supports prior research establishing Qmax as a key diagnostic parameter for obstruction severity and treatment response [4,19]. Anilkumar et al. reported similar flow rates (Qmax 9.26, Qave 4.85 mL/s) with comparable

negative IPSS correlations (r=-0.824, -0.758; p<0.001) [18], while Singla et al. noted analogous trends (Qmax 10.6, Qave 6.0 mL/s) emphasizing time-dependent parameter influences in elderly LUTS [17]. Oranusi et al.'s higher Qmax (15.6 mL/s) maintained negative IPSS correlations [4], and Romero et al. demonstrated decreasing Qmax with worsening IPSS (OR 0.822, 95% CI 0.736-0.918) [16]. Voiding parameters differed significantly by BOO severity (p<0.001). Severe cases showed: Reduced voided volume (109.11 mL vs 152.77 moderate, 225.86 mild) and Prolonged durations (voiding time 56.41 sec vs 40.26, 24.31; flow time 52.23 sec vs 40.26, 24.31; Tmax 13.05 sec vs 9.11, 5.45).

These correlated strongly with IPSS (VV r=-0.904; voiding time r=+0.962; flow time r=+0.934; Tmax r=+0.966; all p<0.001), consistent with Romero et al.'s inverse volume-severity relationship [16], though Oranusi et al. reported nonsignificant correlations [4]. Demographically, patients averaged 59.15±9.75 years (67% aged 50-69), aligning with Thapa et al. (mean 65.2, 47.5% aged 60-69) [20] and Romero et al. (66.7 years) [16]. Other studies report older cohorts (Anilkumar et al. 69, Singla et al. 67.7, Oranusi et al. 67.2 years) [4,17,18]. Diabetes prevalence was high (70%), with severe BOO patients more likely to be ≥70 years (47.06% vs 7.41% moderate, 0% mild) and diabetic (94.12% vs 92.59%, 13.79%; p<0.001). This metabolic association echoes Romero et al.'s findings linking metabolic abnormalities to LUTS development in aging men [16], potentially mediated through prostatic inflammation - metabolic syndrome correlates with increased prostate volume and anteroposterior diameter [21,22].

5. Limitations Of The Study

This single-center study had a modest sample size (n=100) and lacked urodynamic confirmation of BOO. Selection bias may exist due to purposive sampling. The cross-sectional design prevents causal inferences. Generalizability may be limited as most participants were diabetic males from one hospital. Larger multicenter studies with longitudinal follow-up are needed.

6. Conclusion

This study demonstrates significant correlations between uroflowmetry parameters and IPSS scores, with Qmax emerging as the most clinically relevant flowmetric indicator. Our findings confirm that advanced age and diabetes mellitus are strongly associated with BOO severity. We recommend that all patients presenting with BOO symptoms undergo comprehensive evaluation using both IPSS and uroflowmetry as essential baseline investigations before initiating any therapeutic intervention, whether medical or surgical. These standardized assessments provide objective measures for diagnosis, severity stratification, and treatment monitoring.

7. Recommendation

Based on study findings, we recommend: 1) Larger cohort studies to validate results, 2) Training for accurate IPSS scoring, and 3) Wider availability of uroflowmetry as an affordable, non-invasive diagnostic tool. These measures will improve BOO assessment and management in clinical practice.

References

[1] Maina, Samuel M. Correlation Between Postvoid Residual Urine Volume and Lower Urinary Tract Symptoms as Measured by International Prostate Symptom Score in Patients with Benign Prostate Enlargement in Knh. Diss. University of Nairobi, 2021.

[2] Austin, Paul F., et al. "The standardization of terminology of lower urinary tract function in children and adolescents: Update report from the standardization committee of the International Children's Continence Society." Neurourology and urodynamics 35.4 (2016): 471-481.

[3] Liao, Chun-Hou, and Hann-Chorng Kuo. "Use of the International Prostate Symptom Score voiding-to-storage subscore ratio in assessing lower urinary tract symptoms." Tzu Chi Medical Journal 26.2 (2014): 61-63.

[4] Oranusi, C. K., A. E. Nwofor, and O. Mbonu. "Correlation between international prostate symptom score and uroflowmetry in patients with benign prostatic hyperplasia." Nigerian Journal of clinical practice 20.4 (2017): 454-458.

[5] Zhang, Amy Y., and Xinyi Xu. "Prevalence, burden, and treatment of lower urinary tract symptoms in men aged 50 and older: a systematic review of the literature." SAGE Open Nursing 4 (2018): 2377960818811773.

[6] Kupelian, Varant, et al. "Nocturia and quality of life: results from the Boston area community health survey." European urology 61.1 (2012): 78-84.

[7] Chapple, Christopher, et al. "Prevalence of lower urinary tract symptoms in China, Taiwan, and South Korea: results from a cross-sectional, population-based study." Advances in Therapy 34 (2017): 1953-1965.

[8] Park, Hyun Jun, et al. "Urinary tract symptoms (LUTS) secondary to benign prostatic hyperplasia (BPH) and LUTS/BPH with erectile

dysfunction in Asian men: a systematic review focusing on tadalafil." The world journal of men's health 31.3 (2013): 193-207.

[9] Langan, Robert C. "Benign prostatic hyperplasia." Primary Care: Clinics in Office Practice 46.2 (2019): 223-232.

[10] Pinto, Julian Dong Oh, et al. "Health-related quality of life and psychological well-being in men with benign prostatic hyperplasia: An integrative review." Japan Journal of Nursing Science 13.3 (2016): 309-323.

[11] Soler, Roberto, et al. "The prevalence of lower urinary tract symptoms (LUTS) in Brazil: Results from the epidemiology of LUTS (Brazil LUTS) study." Neurourology and Urodynamics 37.4 (2018): 1356-1364.

[12] Egan, Kathryn Brigham. "The epidemiology of benign prostatic hyperplasia associated with lower urinary tract symptoms: prevalence and incident rates." Urologic Clinics 43.3 (2016): 289-297.

[13] Barry, Michael J., et al. "The American Urological Association symptom index for benign prostatic hyperplasia." The Journal of urology 197.2S (2017): S189-S197.

[14] Pozzi, Edoardo, et al. "Can we rely solely on the international prostate symptoms score to investigate storage symptoms in men with lower urinary tract symptoms associated with benign prostatic enlargement? Findings from a cross-sectional study." European Urology Focus 8.2 (2022): 555-562.

[15] Alothmany, Nazeeh, et al. "Critical review of uroflowmetry methods." Journal of Medical and Biological Engineering 38 (2018): 685-696.

[16] Romero, Romeo-Lloyd T., et al. "Male lower urinary tract symptoms in correlation with age, quality of life scores, parameters of uroflowmetry and prostate size, a single institution study." Philippine Journal of Urology (2019): 23-29.

[17] Singla, Sanjeev, et al. "Experience with uroflowmetry in evaluation of lower urinary tract symptoms in patients with benign prostatic hyperplasia." Journal of clinical and diagnostic research: JCDR 8.4 (2014): NC01.

[18] Ugraiah, Anilkumar B., and Sharvari Shyam. "Correlation of international prostate symptom score and uroflowmetry in evaluation of benign prostatic hyperplasia." (2020).

[19] Cheng, Yu, et al. "The influence of intubation on urinary flow parameters in pressure-flow study and its significance for urodynamic diagnosis." International Urogynecology Journal 33.11 (2022): 3103-3110.

[20] Thapa, Niraj, and C. S. Agrawal. "Correlation of uroflowmetry with lower urinary tract symptoms in patients with symptomatic benign prostatic hyperplasia at eastern part of Nepal: A prospective study." IOSR-J Dental Med Sci 16.1 (2017): 86-91.

[21] De Nunzio, Cosimo, et al. "Metabolic syndrome and lower urinary tract symptoms in patients with benign prostatic enlargement: a possible link to storage symptoms." Urology 84.5 (2014): 1181-1187.

[22] Omran, Asma, et al. "Metabolic syndrome is associated with prostate enlargement: a systematic review, meta-analysis, and meta-regression on patients with lower urinary tract symptom factors." Therapeutic Advances in Endocrinology and Metabolism 12 (2021): 20420188211066210.

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