

## CORRELATION BETWEEN THE VISUAL PROSTATE SYMPTOM SCORE AND INTERNATIONAL PROSTATE SYMPTOM SCORE IN PATIENTS WITH LOWER URINARY TRACT SYMPTOMS

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### Abstract

**Background:** Benign prostatic hyperplasia (BPH) is a common disease affecting elderly males. It causes troublesome lower urinary tract symptoms (LUTS), decreasing quality of life. Our study analysed the agreement and correlation between IPSS and VPSS to determine whether the reduced number of questioner and pictorial representations could reliably be used instead of IPSS. **Materials and Methods:** This retrospective and prospective study was conducted for one year at Madras Medical College & Rajiv Gandhi Government Hospital. The study group comprised 150 male patients, and all male patients presenting with LUTS due to BPH and age >40 were included. A complete medical history was obtained from each patient, followed by routine clinical, external genitalia, DRE and dipstick urine analysis. Qmax, average urinary flow rate, Qave and voided volume were measured. **Results:** The average age of our patients is 61.3 years, and BPH is most common in the 50-60 age group of patients (n=71). The IPSS score in post-treatment was 97 patients with mild and 53 patients with moderate symptoms. In the VPSS score, 98 patients with mild, 52 patients with moderate symptoms, and no patients with severe in the IPSS, and VPSS score post-treatment. After treatment, 95 patients had a Qmax of 10-15 ml/sec, and 23 patients had a Qmax of > 15 ml/sec. Pre- and post-treatment of the quality-of-life, Qmax IPSS and VPSS show a positive correlation. **Conclusion:** The VPSS scoring system for LUTS is equivalent to an even better than the IPSS questionnaire, but further validation is needed.

## INTRODUCTION

One of the most common diseases affecting elderly males is benign prostatic hyperplasia (BPH). It causes troublesome lower urinary tract symptoms (LUTS), which decreases the quality of life by affecting the day-to-day activities & sleep of the patients.<sup>[1,2]</sup> BPH starts to occur usually after 40 years of age. As age progresses, symptomatic and histo-pathological BPH incidence and prevalence increase. At 60, the prevalence is > 50%, and by age 85, the majority is reaching as high as 90%.<sup>[3,4]</sup> Along with it, the severity of LUTS also increases with age. But the risk factors for developing severe LUTS or complications are poorly understood. Mortality and serious complications associated with BPH are rare. But the morbidity due to LUTS are bothersome to most patients, and the amount of bother & the impact of LUTS on QOL are highly

variable among individuals. But decrease in QOL decides the mode and urgency of treatment the patient needs.

Benign prostatic hyperplasia (BPH) is characterized by increased stromal and epithelial cell numbers in the periurethral zone of the prostate. The chief complaint of patients with BPH is obstructive and irritative symptoms, which are not specific to BPH but can be caused by other conditions. Patients with BPH seek treatment for severe symptoms or affected quality of life.<sup>[5-7]</sup> Describing the severity of symptoms by patients will vary highly from an individual. Hence, quantifying signs is important for assessing the severity of the disease, measuring the response to treatment, and detecting symptoms' progression in watchful waiting men.

WHO approved using the IPSS (International Prostate Symptom Score) scoring system developed by the American Urological Association (AUA) in 1992 for assessing the severity of symptoms in

BPH. IPSS score uses seven questions to evaluate the symptoms associated with BPH. Depending on the total score, it classifies patients from mild (0 to 7) to moderate (8 to 19) or severe (20 to 35) groups of LUTS.<sup>[8,9]</sup> The IPSS scoring system is validated for its clarity and test/retest reliability but has disadvantages. It is time-consuming, has to be translated into different languages, and most BPH patients are men aged 60-80 with visual and cognitive impairment.<sup>[10]</sup> This could lead to bias in the patient's response, but some studies have disproved it. It also won't consider other symptoms of LUTS, like incontinence.

Van der Walt et al.<sup>[11]</sup> developed a visual prostate symptom score (VPSS) that uses four pictograms to assess four IPSS questions related to frequency, nocturia, weak stream and quality of life. Various studies have validated it, and it has a total score of 18 questions with a maximum answer of 6 and a visual analogue scale. Our study analysed the agreement and correlation between IPSS and VPSS to determine whether the reduced number of questioner and pictorial representations could reliably be used instead of IPSS. If so, VPSS would minimise the difficulty for the patient and make the use of this questionnaire more efficient for the clinician.

## MATERIALS AND METHODS

This retrospective and prospective study was conducted at the Institute of Urology, Madras Medical College & Rajiv Gandhi Government Hospital, Chennai, for one year (February 2015 - January 2016).

After getting informed written consent and ethical committee approval, this study group comprised 150 male patients.

### Inclusion Criteria

All male patients presenting with LUTS due to BPH and age >40 were included.

### Exclusion Criteria

Patients having other causes for BOO, like stricture urethra, previous urethral surgery, and those with acute prostatitis and vesical calculus, were excluded. A complete medical history was obtained from each patient. Routine clinical, external genitalia examination, digital rectal examination (DRE) and dipstick urine analysis were performed. The Qmax, average urinary flow rate (Qave) and voided volume (VV) were measured using a Uroflow - uroflowmeter. The test is taken as a valid one if the voided volume is >150ml. After this, residual volume (PVR) was measured using a mind ray ultrasound machine with a 2.3 MHz probe. A single urinary flow measurement was obtained in each patient and was repeated 30 after treatment. Serum

creatinine and prostate-specific antigen (PSA) were also assayed.

All patients were requested to complete a validated Tamil version of the IPSS questionnaire. This consists of seven questions: Q1-incomplete emptying, Q2-frequency, Q3-intermittency, Q4-urgency, Q-5 weak urine stream, Q-6 straining to, void Q-7 nocturia. Each question has six responses with a score ranging from 0-5. The total sum was obtained by adding up scores of 7 questions. The IPSS questionnaire Q2, Q4, and Q7 are related to irritative symptoms; Q1, Q3, Q5, and Q6 are about obstructive symptoms. QoL of patients was asked as a separate question (Q8).

They must complete the VPSS questionnaire with only four pictograms and no questions. The pictogram evaluated P1- frequency, P2-nocturia, P3-force of urinary stream, and P4- QoL of patients. The scores were given depending on the pictures they selected. Among the pictograms, P1 and P2 were related to irritative symptoms, and P3 was about obstructive symptoms. The patients' characteristics included age, level of education, ability to speak, read, and understand Tamil, need for help completing the questionnaire, and time taken considered.

The sample size of our study group was large enough for statistical validation and adequate to minimize any hidden bias. The scores of each participant on AUA-SS (range 0 to 35) and VPSS pictogram (range 0 to 18) were calculated and statistically analysed. The Chi-square test was used in needed places for contingency table analysis to evaluate factors associated with how the patient completed the IPSS questionnaire and VPSS pictogram. Other factors, like correlation analysis between IPSS and VPSS, were assessed using Spearman's correlation coefficients. Fisher exact test to compare categorical variables, student t-test and chi-square test, and univariate and multivariate analysis was used to compare continuous variables and their significance. A p-value < 0.05 was taken as statically significant.

We used Bland-Altman plots to check whether the VPSS pictogram & IPSS total scores were in agreement. The Bland- Altman plot is the mean of two values for each participant (IPSS - VPSS)/2, and the difference between the total values of the IPSS questionnaire- VPSS pictogram. The scores were weighted to a value of between 0 and 1 to correctly compare the VPSS and IPSS scores of the patient. Irrespective of the management mode, whether it's surgery/medical therapy after treatment, analysis was done with the same questionnaire. Both before and after surgery, uroflowmetry was performed. The Qmax score was also considered to analyse the correlation between the IPSS score and VPSS pictogram.

## RESULTS

The average age of our patients is 61.3 years, and BPH is most common in the 50-60 age group of patients (n=71). Twenty-four patients had graduated and above, 51 patients had completed 10th standard and above, and 75 patients had education below 10th standard (Table 1).

**Table 1: Demographic data of the study**

		Frequency
Age group	40-50	14
	51-60	71
	61-70	43
	71-80	22
Literacy level	Below 10 <sup>th</sup> STD	75
	10 <sup>th</sup> STD and above	51
	Graduation and above	24

The IPSS score in pre-treatment was 12 patients with mild, 108 with moderate and 30 with severe symptoms. In the VPSS score, 14 patients had mild, 105 patients had moderate, and 31 with severe symptoms.

The IPSS score in post-treatment was 97 patients with mild and 53 patients with moderate symptoms. In the VPSS score, 98 patients with mild, 52 patients with moderate symptoms, and no patients with severe in the IPSS, and VPSS score post-treatment.

In terms of Qmax, before treatment, 68 patients had a Qmax of < 10 ml/sec, 59 patients had a Qmax of 10-15 ml/sec, and 23 patients had a Qmax of > 15 ml/sec. After treatment, there were no patients with a Qmax of < 10 ml/sec, 95 patients had a Qmax of 10-15 ml/sec, and 23 patients had a Qmax of > 15 ml/sec (Table 2).

**Table 2: Pre- and post-treatment of IPSS score, VPSS score and Qmax**

		IPSS score (n)	VPSS score (n)
Pre-treatment	Mild	12	14
	Moderate	108	105
	Severe	30	31
Post-treatment	Mild	97	98
	Moderate	53	52
	Severe	0	0
Qmax (ml/sec)		Pre-treatment	Post-treatment
	< 10	68	0
	10-15	59	95
	>15	23	23

**Table 3: Correlations between the visual prostate symptom score (VPSS), international prostate symptom score (IPSS) and maximum and average urinary flow rates**

Spearman's Rank correlation	Follow-up pts (n+150)		VV >150ML		VV < 150 ML	
	Coefficient (r)	P-value	Coefficient (r)	P-value	Coefficient (r)	P-value
Total score	0.861	<0.001	0.944	<0.001	0.754	<0.001
VPSS QA vs IPSS Q5	0.675	<0.001	0.778	<0.001	0.643	0.002
VPSS QB vs IPSS Q2	0.867	<0.001	0.528	<0.001	0.909	0.01
VPSS QC vs IPSS Q7	0.804	<0.001	0.941	<0.001	0.575	0.003
VPSS QoL vs IPSS QoL	0.762	<0.001	0.905	<0.001	0.697	<0.001
Qmax Vs IPSS Q2	-0.407	0.223	- 0.385	0.037	-0.428	0.033
Qmax Vs IPSS Q5	-0.156	<0.001	0.009	<0.001	-0.347	0.087
Qmax Vs IPSS Q7	-0.395	0.43	0.196	0.402	-0.433	0.005
Qmax Vs IPSS QoL	-0.079	<0.001	-0.334	<0.001	-0.201	0.364
Qmax Vs VPSS QA	-0.514	<0.001	-0.905	<0.001	-0.339	0.002
Qmax Vs VPSS QB	0.544	0.117	-0.567	0.0006	-0.429	0.047
Qmax Vs VPSS QC	-0.109	0.564	-0.579	0.385	-0.294	0.009
Qmax Vs VPSS QoL	-0.079	<0.001	-0.854	<0.001	-0.368	0.213

Compared variables	Spearman coefficient
Pre-treatment IPSS vs VPSS	0.921 (p<0.001)
Post-treatment IPSS vs VPSS score	0.914 (p<0.001)
Comparison of pre-treatment Quality of life index IPSS vs VPSS	0.912 (p<0.001)
Comparison of post-treatment Quality of life index IPSS vs VPSS	0.861 (p<0.001)
Comparison of pre-treatment Qmax (ml/sec) IPSS vs VPSS	0.923 (p<0.001)
Comparison of post-treatment Qmax (ml/sec) IPSS vs VPSS	0.947 (p<0.001)

Pre- and post-treatment of IPSS and VPSS show a positive correlation ( $r=0.921$ ,  $p<0.001$ ) and ( $r=0.914$ ,  $p<0.001$ ).

Pre- and post-treatment of the quality-of-life IPSS and VPSS show a positive correlation ( $r=0.912$ ,  $p<0.001$ ) and ( $r=0.861$ ,  $p<0.001$ ).

Pre- and post-treatment of the Qmax (ml/sec) IPSS and VPSS shows a positive correlation ( $r=0.923$ ,  $p<0.001$ ) and ( $r=0.947$ ,  $p<0.001$ ) (Table 3, Figures 1 and 2).

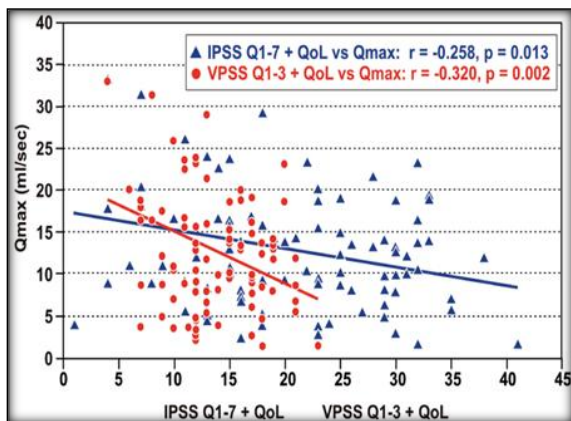


Figure 1: Correlation of Qmax (ml/sec) IPSS and VPSS

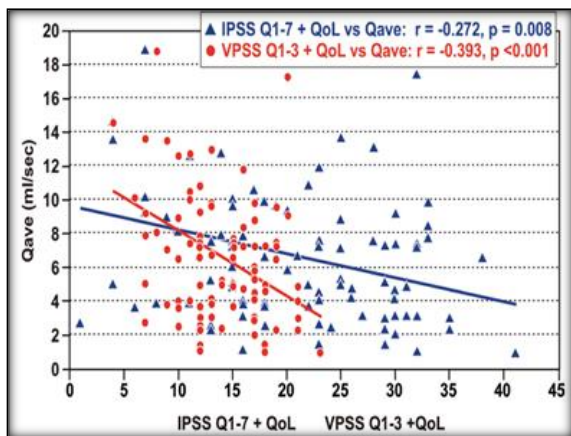


Figure 2: Correlation of Qave (ml/sec) IPSS and VPSS

## DISCUSSION

IPSS scoring system is the gold standard scoring system and is accepted by WHO for analyzing patients with LUTS due to BPH. It has seven questions to evaluate the symptoms in BPH patients. The patient chose 1 to 6 answers depending on the severity of his symptoms. The total score from 7 questions ranges from 0 to 35. Suppose the score is < 7-Mild, 8-19-Moderate, and score >20-Severe. The higher number of questions, language barrier,

difficulty understanding the questions, and time consumption make the IPSS questionnaire difficult for patients with low educational status. They may fail to understand and respond correctly to the IPSS questionnaire questions, particularly when the patient's education level is over ten years of education. The mistakes are 21 times more common in patients with fewer than nine years of education.<sup>[12]</sup>

Cam K et al.<sup>[13]</sup> reported that 49% of patients with low educational levels couldn't mark any questions in the IPSS questionnaire. They proved that the grade 6 reading level (American academic standards) must read and understand the question in the IPSS questionnaire. A study from Van der Walt et al.<sup>[11]</sup> found that assistance was needed in 87% of patients with an education grade  $\leq 7$  compared with 24% in patients if an education grade  $\geq 10$ .

In our study, even illiterate patients (around 18%) could complete the IPSS questionnaire without assistance. We proved that language is not a barrier since VPSS has only pictorial representations and not having any printed questions. This avoids the risk of bias of the interpreter, which may influence patients' responses to their symptoms. We found that fewer patients (4% vs 30%) required assistance to complete VPSS than IPSS.

Hayns CF et al.<sup>14</sup> from Namibia, proved that VPSS took less time to complete than the IPSS, even in men with low education levels. VPSS may have some advantages over IPSS, like easy to understand, because of using the schematic pictogram, less time consumption, no requirement of assistance, and language is not a barrier. The strength of the linear relationship between the two total scores of a patient who responded to both questionnaires (IPSS & VPSS) were studied by Spearman correlation coefficients.

Our study showed a good linear relationship between VPSS and IPSS total symptom scores and quality of life questions. This relationship was proved by using the Spearman correlation coefficient. A negative association exists between QOL, VPSS & IPSS scores. QOL has been measured in all patients both before and after treatment, irrespective of the mode of treatment. The correlation was again well established between the two questionnaires. These results were comparable with the results mentioned in other studies.<sup>[15]</sup>

In this study, Qmax is also included and compared to the VPSS scoring system, and the results were found to be in a negative correlation with both pre-treatment and post-treatment levels. However, while evaluating a new questionnaire vs an established and standard gold questionnaire, we must check whether

the newer one correlates well with, the older and established questionnaire. We used Bland-Altman plots to establish this correlation. Bland-Altman is a graphical method used to compare two measurement techniques. Various studies worldwide used this technique to determine the two systems' agreement. This graphical method used the differences between the two techniques plotted against the average of the two techniques. The IPSS score of each participant is divided by 35(max score of IPSS), and the VPSS score of each participant is divided by 18 (max score of VPSS). By doing this, the values are rescaled between 0 to 1 and the graph is plotted in the x and y-axis using the values obtained by following the formula  $IPSS+VPSS/2$ ,  $IPSS-VPSS$ , respectively. This analysis shows both systems agreed if the values plotted were within the confidence limit. Both before-treatment and after-treatment (irrespective of the mode of treatment, medical or surgical) IPSS and VPSS scores were in good agreement for all 150 patients.

Since the responses to both systems vary widely from the seven questions in the IPSS questionnaire and only pictograms in the VPSS system, we have compared the Quality-of-life index of IPSS and the Quality-of-life index of VPSS score also. Irrespective of this fact, we found that they agree well in the pre-and post-treatment analyses. When patients were questioned about the easiness of both questionnaires, around 94 % of the patients who participated in this study said that the VPSS scoring system was more accessible than the IPSS questionnaire and less time-consuming. The answer was the same irrespective of their literacy level.

The probable reason may be the reduced number of questions and their pictorial representations, which made the VPSS very to understand. In this study, we have proved all these advantages of the VPSS scoring system by comparing it with the gold standard IPSS scoring system. The Spearman correlation coefficient and Bland-Altman plot are needed to prove the chi-square test. Further validation from more studies may be required to replace the VPSS scoring system as a standard protocol in BPH patients to analyze their LUTS symptoms instead of IPSS scoring system.

## CONCLUSION

Our study proves that the VPSS scoring system for LUTS is equivalent and, in some aspects, even better than the gold standard IPSS questionnaire. The reduced number of questions and pictograms made it easy for the patients to respond. This

decreases the burden on patients and makes data collection easier for clinicians. But making the VPSS scoring system a standard protocol for analyzing LUTS patients requires further validation.

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