# ORIGINAL ARTICLE

# New Visual Prostate Symptom Score versus International Prostate Symptom Score in Men with Lower Urinary Tract Symptoms: A Prospective Comparision in Indian Rural Population

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## ABSTRACT

**Introduction:** Benign prostrate hyperplasia (BPH) is a leading source of healthcare problem in aging men around the world including India. Both International Prostate Symptom Score (IPSS) and New Visual Prostate Symptom Score (VPSS) are used to assess the lower urinary tracts symptoms (LUTSs) in men. The present study was planned to compare these two scores, IPSS and VPSS in Indian rural men prospectively and their efficacy was compared with urodynamic evaluation of the patients. **Materials and Methods:** With Institutional Ethical Committee approval, this study was conducted on 100 patients having LUTS and BPH after obtaining written informed consent. Patients' educational status was noted. All the patients were requested to complete the IPSS and VPSS questionnaire, and they were correlated. The urodynamic study was performed on all the patients with uroflowmeter. Two parameters of uroflowmetry, $Q_{max}$ (maximum urine flow rate expressed in ml/s) and $Q_{avrg}$ (average urine flow rate expressed in ml/s) were measured and correlated. **Results:** Most of the patients (55%) in this study were uneducated. Out of 100 patients, 83% were able to fill the VPSS questionnaire without assistance as compared to only 40% patients in IPSS questionnaire ($Z = 6.557$, $P < 0.001$). There was a positive correlation between IPSS and VPSS total score in this study ($r = 0.453$ and $P ≤ 0.001$). It was noticed that IPSS Question 2 for frequency of urination had a positive correlation with VPSS Question 1 (day time frequency of urination) $r = 0.645$ ($P = 0.000$). Similarly, IPSS Question 7 for night frequency when compared with VPSS Question 2 (nocturia); the value for $r$ was found to be 0.536 ($P = 0.000$).The IPSS Question 5 for straining when compared to the VPSS Question 3, i.e., the question for the strength of stream during micturition; the positive correlation was found to be 0.266 ($P = 0.007$). There was a negative correlation between IPSS total score and $Q_{avrg}$ with value − 0.368 ($P = 0.000$) and between IPSS total score and $Q_{max}$ of − 0.433 ($P = 0.000$). A negative correlation is also noted between VPSS total score and $Q_{avrg}$ of value 0.497 ($P = 0.000$) and VPSS total score and $Q_{max}$ of value − 0.719 ($P = 0.000$). **Conclusion:** VPSS correlates significantly with the IPSS to quantify the LUTS due to BPH. The VPSS can be used instead of the IPSS for the assessment of symptom severity in men with LUTS, who are illiterate or have limited education.

**KEYWORDS:** Benign prostrate hyperplasia, lower urinary tracts symptoms, symptom scores, uroflowmetry

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## INTRODUCTION

Benign prostrate hyperplasia is one of the most common conditions among aging men, making BPH a leading source of healthcare problem of old age in the world.[1] BPH is actually a histological diagnosis due to the proliferation of smooth muscles and epithelial cells within the prostatic tissue.[2,3] The prevalence increases with age. In a study by McVary, it was estimated that 90% of men between 45 and 80 years of age will have some types of symptoms due to BPH.[4]

Understanding the disease pathophysiology and its progression; symptom complex and its effects on the population is essential.

Similarly, grading of the symptoms of BPH is also very necessary to establish a proper guideline for treatment and also to assess the efficacy of treatment at its various stages. In view of all these concerns various symptom scores and symptom index have been developed so far in various parts of the world for grading BPH symptoms among the affected individuals.

Most patients with BPH present with symptoms of difficulty in voiding. These symptoms complex are nonspecific and are identified by a variety of terms collectively called lower urinary tract symptoms [LUTSs].[5] Although LUTS secondary to BPH (LUTS/BPH) are often not life-threatening conditions, they significantly affect the quality of life (QoL).[6]

Diagnosis of BPH relies almost entirely on patient reporting and complaints of LUTS unlike the diagnosis of many common geriatric diseases such as a cardiovascular disease which are usually based on a combination of objective laboratory tests and radiologic assessments in addition to more subjective patient reporting.

This subjective dependency for the elaboration of symptoms in men with LUTS demanded a need for developing a system care that can be used and reproduced to evaluate symptoms and hence can help to guide management strategies.[7]

The first version of the International Prostate Symptom Score (IPSS) [Figure 1] was created in 1992 by the American Urological Association (AUA) and consisted of seven questions. It originally lacked the 8th Question about QoL); hence, its original name was AUA symptom index (AUA) or AUA-7. It has been adopted by the World Health Organization as the IPSS. Each question, evaluating a combination of urinary storage and voiding symptoms, allows the patient to choose 1 of 6 answers indicating increasing severity of the particular symptom. The answers are assigned points from 0 to 5. The total score ranges from 0 to 35 (asymptomatic to very symptomatic). Additional 8th Question on QoL was added later on.

The IPSS was designed to be an easy, self-administered questionnaire which can be used even in primary health care clinics. It represents an attempt to convert subjective symptoms into objective numbers that can be further quantified.

However, this symptom score has a drawback that the patients with lower educational levels experience greater difficulty completing the IPSS. It has been established that a grade 6 reading level (American Educational Standards) is necessary to understand the IPSS.[8] Thus, in country like ours, especially rural areas, with low educational level and poor socioeconomic status, this problem is more in magnitude rendering this symptom score very difficult to comprehend and used by the people.

van der Walt *et al.*[9] reported that 24–87% of 96 men with LUTS (depending on their level of education) required assistance to complete the IPSS questionnaire. They thereby agreed that

the IPSS is difficult to understand even for men with a high level of education. The authors argued that getting help from a physician, a nurse, or a family member to complete the IPSS might cause miscommunication, influence the patient's responses, and introduce the risk of bias. It has been translated into many languages, but the translation of the IPSS into other languages needs to be validated. Moreover, elderly men can have visual impairments that may cause difficulty in reading the IPSS questions.

van der Walt *et al.* then developed a visual prostate symptom score (VPSS) [Figure 2] using pictograms to assess four IPSS questions related to frequency, nocturia, weak stream, and QoL. The VPSS differs from the IPSS in presenting the AUA questionnaire in a pictorial format enabling the old and often illiterate men to assess their urinary problems in a much easier and a reliable manner. Moreover, a new concept of QoL added in the VPSS helps to better understand the symptoms and its effect on patients day-to-day life.

VPSS deals with the analysis of visual prospect of the symptoms explained in the IPSS previously used by AUA. The four pictures are assigned symptom index 1–6 for each, and the score is calculated according to severity. The total score can range from 0 to 24 (asymptomatic to very symptomatic).

As cultural and languages diversities can affect the interpretation of these symptoms and hence management, this study was planned to compare these two scores, IPSS and VPSS in Indian rural prospective and their efficacy have been measured in view of the urodynamic analysis of patients.

## MATERIALS AND METHODS

With Institutional Ethical Committee approval, this prospective study was conducted in the Department of Surgery at GGS Medical College and Hospital, Faridkot between the months of April 2012 and October 2013. Written informed consent was obtained from all patients. Based on the previous studies, the effect size was calculated as 0.318. Taking alpha error as 0.05 and power required 90%, the sample size needed was 96. Hence, a total of 100 patients were enrolled in the study.

### Inclusion criteria

Male patients of age >40 years complaining of LUTS due to BPH.

### Exclusion criteria

Patients having Voided volume <150 ml on uroflowmetry and with chronic urinary retention having derranged renal function tests were excluded from the study. A thorough history was recorded in all the cases and detailed general and systemic examination was carried out. Patient's educational status was noted, and the patients were divided into four groups according to their literacy. Digital rectal examination was done in every case with empty bladder to assess the size of the prostate, surface,

consistency of the gland, and mucosa over the rectal wall. Serum prostate-specific antigen assay and ultrasonography was carried out in all the cases to measure the prostrate size.

All the patients were requested to complete the IPSS comprising the 7 questions. The degree of severity of these symptoms was noted from 0 to 5. The maximum score in the IPSS was thus 35. The symptoms were then classified into:

   I.   Mildly symptomatic: Score from 0 to 7
   II.  Moderately symptomatic: Score from 8 to 19
   III. Severely symptomatic: Score from 20 to 35.

A separate question for QoL was also present in the IPSS questionnaire, and the degree of impairment of QoL was noted from 0 to 6. The patients who were unable to complete the questionnaire on their own, they were assisted by a reliable relative/doctor.

The patients were also requested to complete the VPSS comprising four pictograms to evaluate the symptoms of BPH. The degree of severity of these symptoms was noted from 0 to 6. Maximum score on VPSS was 24 and the symptoms were divided into three categories:

   I.   Mildly symptomatic: <8
   II.  Moderately symptomatic: 9–16
   III. Severely symptomatic: 17–23.



**Figure 1:** International prostate symptom score (IPSS)

The urodynamic study was performed on all the patients with a uroflowmeter. Two parameters of uroflowmetry were measured:

   I.   $Q_{max}$, i.e., maximum urine flow rate expressed in ml/s
   II.  $Q_{avrg}$, i.e., average urine flow rate expressed in ml/s.

The IPSS total score and VPSS total score were analyzed with these two urodynamic parameters, and their efficacy to quantify the symptoms of LUTS in BPH were compared using these two parameters. Similarly, the individual parameters of these two scoring systems for frequency, nocturia, and straining were also correlated with urodynamic parameters, and their correlation values were obtained.

All the patients were put on appropriate therapy as per the results of VPSS. Follow-up of all the 100 patients was done 3 months later from the initiation of the treatment, and the efficacy of treatment was evaluated in terms of improvement of urodynamic parameters, i.e., $Q_{max}$ and $Q_{avrg}$.

## Statistical analysis

Statistical analysis was performed using IPS version 19 (IBM SPSS Statistics for Windows, Version 19.0. Armonk, NY: IBM
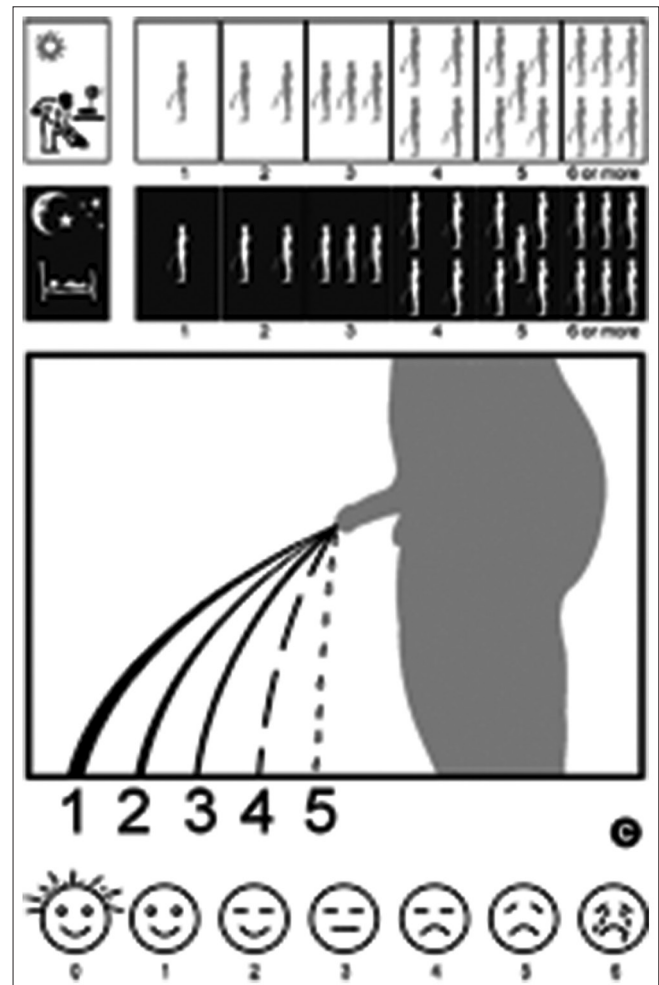


**Figure 2:** Visual prostate symptom score (VPSS)

Corp.), with the Mann–Whitney U-test for comparison of means, Spearman and Pearson's test for correlation analysis, and two-tailed *P* < 0.05 was accepted as statistically significant and <0.01 as highly significant.

## RESULTS

A total of 100 male patients were enrolled in the study. Their age and educational status are shown in Table 1 and Figure 3. Distribution of patients according to the severity of symptoms
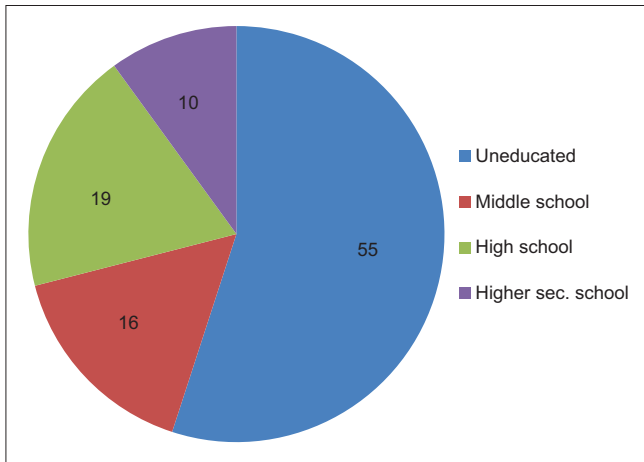


**Figure 3:** Distribution of cases (in percentages) according to the level of education

in IPPS and VPPS is shown in Table 2. Mode of assessment of questionnaire is depicted in Table 1. Correlations value for total symptom score and their individual variables along with prostrate size is shown in Table 3. Correlations value with urinary flow parameters is shown in Table 4. Response to treatment after 3 months of treatment is shown in Table 5.

**Table 3: Comparison of correlations between symptom scores**

| | Correlation coefficient (*r*) | *P* |
|---|---|---|
| IPSS 2 (frequency) versus VPSS 1 (day frequency) | 0.645[†] | 0.000[‡] |
| IPSS 7 (nocturia) versus VPSS 2 (night frequency) | 0.536[†] | 0.000[‡] |
| IPSS 5 (weak stream) versus VPSS 3 (straining) | 0.266[†] | 0.007[‡] |
| Total IPSS with prostrate size | −0.121[*] | 0.231[§] |
| Total VPSS with prostrate size | 0.039[*] | 0.699[§] |
| Total IPSS with quality of life | 0.693[†] | 0.000[‡] |
| Total VPSS with quality of life | 0.430[†] | 0.000[‡] |

*Pearson's *r*, [†]Spearman *r*; [‡]*P*<0.01; Significant at 0.01 level; [§]*P*>0.05; not significant. IPSS: International Prostate Symptom Score, VPSS: Visual Prostate Symptom Score

**Table 4: Comparison of correlations between symptom scores and urinary flow parameters**

| | Pearson's *r* (*P*) | |
|---|---|---|
| | $Q_{max}$ | $Q_{avrg}$ |
| Total IPSS | −0.433 (0.000) | −0.368 (0.000) |
| Total VPSS | −0.719 (0.000) | −0.497 (0.000) |
| IPSS 1 (incomplete voiding) | −0.222 (0.026) | −0.212 (0.035) |
| IPSS 2 (frequency) | −0.349 (0.000) | −0.293 (0.003) |
| IPSS 3 (intermitted urination) | −0.438 (0.000) | −0.438 (0.000) |
| IPSS 4 (urgency) | −0.328 (0.001) | −0.277 (0.005) |
| IPSS 5 (weak stream) | −0.159 (0.114) | −0.103 (0.306) |
| IPSS 6 (straining) | −0.215 (0.032) | −0.173 (0.086) |
| IPSS 7 (nocturia) | −0.254 (0.011) | −0.222 (0.026) |
| VPSS 1 (day frequency) | −0.459 (0.000) | −0.254 (0.011) |
| VPSS 2 (night frequency) | −0.570 (0.000) | 0.399 (0.000) |
| VPSS 3 (straining) | −0.636 (0.000) | −0.538 (0.000) |
| VPSS 4 (quality of life) | −0.586 (0.000) | −0.364 (0.000) |

IPSS: International Prostate Symptom Score, VPSS: Visual prostate symptom score, $Q_{max}$: Maximum urine flow rate expressed in ml/s, $Q_{avrg}$: Average urine flow rate expressed in ml/s

**Table 1: Distribution of cases among age groups on the basis of mode of assessment of International Prostate Symptom Score and visual prostate symptom score**

| Age group (years) | Mean prostrate volume (g) | Mode of assessment IPSS | | Mode of assessment VPPS | |
|---|---|---|---|---|---|
| | | Self | Assistance required | Self | Assistance required |
| 41-50 (*n*=8) | 68.80 | 2 (25) | 6 (75) | 7 (88) | 1 (12) |
| 51-60 (*n*=22) | 72.27 | 8 (36.4) | 14 (63.6) | 18 (81) | 4 (19) |
| 61-70 (*n*=44) | 77.36 | 22 (50) | 22 (50) | 40 (91) | 4 (9) |
| 71-80 (*n*=22) | 80.45 | 8 (36.4) | 14 (63.6) | 16 (72) | 6 (18) |
| 81 onward (*n*=4) | 83.50 | 0 | 4 (100) | 2 (50) | 2 (50) |
| Total (*n*=100) | 76.36 | 40 | 60 | 83 | 17 |

Wilcoxon signed-rank test: *Z*=6.557; *P*<0.001; Significant at 0.01 level. IPSS: International Prostate Symptom Score, VPSS: Visual prostate symptom score

**Table 2: Distribution and comparison of patients according to severity of symptoms**

| Symptom class | IPSS | | VPSS | |
|---|---|---|---|---|
| | Symptom score | Number of patients | Symptom score | Number of patients |
| Mild symptomatic | 1-7 | Nil | 0-8 | 13 |
| Moderate symptomatic | 8-19 | 41 | 9-16 | 60 |
| Severe symptomatic | 20-35 | 59 | 17-23 | 27 |
| Total | | 100 | | 100 |

Spearman's *r*=0.450; *P*<0.001; significant at the level of 0.01. IPSS: International Prostate Symptom Score, VPSS: Visual prostate symptom score

**Table 5: Effect of 3 months treatment on $Q_{max}$ and $Q_{avrg}$ after 3 months**

| Value of $Q_{max}$ and $Q_{avrg}$ (ml/s) | VPSS total symptom score | |
|---|---|---|
| | Mild (before treatment) | Mild (after 3 months of treatment) |
| ≤5 | 0 | 0 |
| 6–10 | 2 | 0 |
| 11–15 | 10 | 0 |
| ≥16 | 2 | 14 |

VPSS: Visual prostate symptom score, $Q_{max}$: Maximum urine flow rate expressed in ml/s, $Q_{avrg}$: Average urine flow rate expressed in ml/s

# DISCUSSION

Benign prostrate hyperplasia being a disease of old age, patients find it difficult to express their symptoms. The problem is more evident in developing countries like India where a large number of aged people are illiterate. Old age and illiteracy together result in great difficulty to assess the symptoms of BPH.

Both IPSS and VPSS have been used successfully to quantify symptoms of BPH, but the IPSS questions are difficult to understand, even for men with a relatively high level of education, patients often ask the doctor or nurse for an explanation of the questions while filling in the form. Moreover, lower education levels have been associated with a greater number of symptoms, which suggests that questionnaire comprehension and patient literacy can affect the LUTS understanding.[10]

In this study, a maximum number of patients, 44% were in the age group 61–70 years. The average age of the study group was 65 years. The level of education is shown in Figure 3. A maximum number of patients, i.e., 55% were uneducated followed by those having high school education group with 19% cases. This was followed by 16% of patients and 10% of patients, respectively for middle school group and higher secondary or above group.

The studies have shown that for each symptom score question, there was an inverse relationship between educational level and symptom misrepresentation.[11,12] This discrepancy was greatest for questions on frequency (Question 2) and urgency (Question 4). In patients with fewer than 9 years of education, 58% misreported their total score by 4 points or greater, and 21% misreported it by >10 points.

## Mode of assessment of questionnaire

In this study, it was easier for the patients to fill the VPSS questionnaire as compared to that of IPSS [Table 1]. Out of 100 patients, 83% were able to fill the VPSS questionnaire without assistance, whereas only 40% of patients were able to fill the IPSS questionnaire without assistance ($Z = 6.557$, $P < 0.001$). van der Walt *et al.* in their study reported that the questionnaire was completed without any assistance by 51 of 96 men (53%) for the IPSS.[9] Difference appreciated could be due to high rate of illiteracy in our country. However, the patients completing VPSS questionnaire without assistance is comparable in both studies, i.e., in this study 83% and van der Walt *et al.* study 82% as 79 of 96 men (82%). The patient of every age group found it easier to complete the VPSS questionnaire without assistance.

## Total International Prostate Symptom and new visual prostate symptom scores

In this study, the IPSS and VPSS scores were divided into mild-moderate and severe symptom categories. There was a positive correlation between IPSS and VPSS total scores [Table 2] in this study ($r = 0.453$ and $P = 0.01$). This proved VPSS to be equally effective in quantifying the LUTS of BPH when compared with IPSS. The result of the present study was consistent with the study of van der Walt *et al.*[9] and Heyns *et al.*[13] In study by Heyns, IPSS and VPSS scores showed a correlation of 0.73 ($P < 0.001$).

## Size of prostate and relation with age

In this study, the size of the prostate gland as measured on ultrasonography was increasing with increasing age group [Table 1]. Mean prostate gland size in this study was 79.91 g. A maximum number of patient (93%) had a prostate size in the range of 41–120 g in this study. Blom and Schröder stated that the natural history of BPH is characterized by an age-dependent increase in histological changes and an increase in prostate size.[14]

## Size of prostate and severity of symptoms

There was no correlation in this study between prostate size as measured on ultrasonography and severity of symptoms [Table 3] on both VPSS and IPSS scores with $r = -0.121$ for IPSS ($P = 0.231$) and 0.039 for VPSS ($P = 0.699$). Patients can present with variety of obstructive and irritative symptoms irrespective of the size of prostate.

## Individual parameter of International Prostate Symptom Score and new visual prostate symptom score

In this study, the relationship of individual parameters for severity of symptoms of BPH were assessed with each other, and it was noticed that IPSS Question 2 for (frequency of urination) had a positive correlation with VPSS Question 1 (day time frequency of urination) [Table 3], the correlation was found to be positive for 0.645 ($P = 0.000$). This states that the VPSS Question 1 can explain the symptom of incomplete emptying among the cases and was found to be easier to be filled by a large number of people as compare to the IPSS questionnaire.

Similarly, in this study [Table 3] when IPSS Question 7 for night frequency was correlated with VPSS Question 2 (nocturia), the value for correlation was found to be 0.536 ($P = 0.000$). The IPSS Question 5 for straining was correlated for the VPSS Question 3, i.e., question for the strength of stream during micturition, the positive correlation [Table 3] was found to be 0.266 ($P = 0.007$).

## Quality of life index

In this study, QoL parameter was used as the fourth question in VPSS in pictorial form. QoL parameter was used in this study as a degree of impairment of QoL. The degree of impairment of QoL increased [Table 3] with increased VPSS score ($r = 0.430$ and $P = 0.000$). In this study, QoL also had a positive correlation [Table 3] with IPSS total score ($r = 0.693$ and $P = 0.000$).

## Total International Prostate Symptom score and severity of symptoms

The IPSS when compared with the uroflowmetric parameters, i.e., $Q_{max}$ for maximum flow rate and $Q_{avrg}$ for average flow rate in the present study, total IPSS score increased with increasing severity of the LUTS of BPH [Table 4]. There was a negative correlation between IPSS total score and $Q_{avrg}$ with value $-0.368$ ($P = 0.000$). This states that the decreasing value of average urinary flow rate results in increase in IPSS total score. There was also negative correlation between IPSS total score and $Q_{max}$ of $-0.433$ ($P = 0.000$) in the present study which states that the decreased maximum urine flow rate was associated with increased severity on IPSS scale. In a study Wadie *et al.* also found that total IPSS versus $Q_{max} - 0.10$ ($P = 0.04$), total IPSS versus $Q_{avrg} - 0.16$ ($P < 0.01$), these results are comparable with this study.[15]

## Total new visual prostate symptom score and severity of symptoms

A negative correlation between VPSS total score and $Q_{avrg}$ of value $-0.497$ ($P = 0.000$) stated that decreased average urine flow rate was associated with increased VPSS total score [Table 4]. The negative correlation between VPSS total score and $Q_{max}$ of value $-0.719$ ($P = 0.000$) stated that the increasing VPSS score was associated with the decreased value of maximum urinary flow rate. In their study Heyns *et al.* proposed that the VPSS and $Q_{max}$ ($r = -0.38$, $P < 0.002$) and the VPSS and $Q_{avrg}$ ($r = -0.37$, $P < 0.003$) were negatively correlated to each other.[13]

Similarly, other questions of both symptoms scores also showed negative correlation with uroflowmetric parameters [Table 4]. The study showed statistically significant negative correlations of the IPSS versus $Q_{max}/Q_{avrg}$ and the VPSS versus $Q_{max}/Q_{avrg}$. The correlation coefficients were of similar magnitude to other studies and were slightly higher for the VPSS than the IPSS. The relatively weak correlations could be partly due to using only single-void flow rate measurements in this study.

## Efficacy of new visual prostate symptom score in treatment of patients

As per the standard protocol for the treatment of BPH, all the patients with mild symptom category were treated with the alpha blockers for 3 months and their follow-up was done at the end of 3$^{rd}$ month. In this study, 14% in VPSS score were diagnosed as mild symptomatic. At the end of 3 months of uroflowmetry was repeated and it was found that the $Q_{max}$ and $Q_{avrg}$ increased in 63% of the total mild symptomatic patients [Table 5]. Increase in response to medical treatment in this study was comparable with the study of Lepor *et al.*[16] The response to treatment in the present study (63%) with medical management in the present study was comparable with post-TURP results of Kaplan.[17]

## CONCLUSION

Thus, in the present study, it was also observed that the VPSS correlates significantly with the IPSS to quantify LUTS due to BPH. The VPSS can be used instead of the IPSS for the assessment of symptom severity in men with LUTS, who are illiterate or have limited education. The VPSS score is also effective in the initiation of the treatment in BPH patients and for follow-up.

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### Conflicts of interest

There are no conflicts of interest.

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