To investigate the correlation between the visual prostate symptom score, the international prostate symptom score, and uroflowmetry parameters in adult Thai males of different educational levels

Vasun Setthawong a,*, Phitsanu Mahawong b, Nusorn Pattanachindakun a, Passakorn Ammatrakul a, Faizan Manzoor Dar c, Surapong Thanavongvibul c

a Division of Urology, Department of Surgery, Lerdsin Hospital, Bangkok, 10500, Thailand
b Division of Urology, Department of Surgery, Faculty of Medicine, Chiang Mai University, Chiang Mai, 50200, Thailand

c MRC Center for Transplantation, King's College, London, United Kingdom

Abstract:

Background: To evaluate the correlation between the International Prostate Symptom Score (IPSS), Visual Prostate Symptom Score (VPSS), and uroflowmetry parameters in Thai males and to examine the possibility in establishing a severity cut-off point for VPSS.

Methods: Between 1st February and 31st May 2016 a total of 200 men were enrolled onto the study and divided into high and low educated groups. All of them were requested to complete paperwork including their personal data, and then to complete a VPSS and IPSS questionnaire. Uroflowmetry, residual urine and prostate size were measured. The relationship between the answers to the VPSS and IPSS together with the other objective parameters was assessed using Spearman’s rank test.

Results: The mean age of the patients was 61.2 years. 69.9% of subjects were highly educated. There was a statistically significant correlation between VPSS and IPSS in total, and any individual scores except frequency score. There was weak correlation between the VPSS and the uroflowmetry parameters and prostate size. The low educated group had a statistically significant lower completion rate of both the VPSS (41.6% vs. 79.8%) and IPSS (61.2% vs. 81.2%) without assistance than the higher educated group and most of the lower educated group felt that the IPSS was easier to understand than the VPSS (51.2% vs. 48.8%, P < 0.001). A VPSS severity score ≤6 or >14 had a very high specificity that predicted the patients would have mild or severe symptoms (94.7% and 98.6%) while a VPSS between 7 and 13 had a high sensitivity (90.8%) but a low specificity (16.9%) when it came to the prediction of moderate symptoms.

Conclusion: VPSS showed a significant correlation to the IPSS and uroflowmetry parameters. A VPSS score ≤6, 7 to 13 and >14 may indicate mild, moderate, and severe symptoms respectively.

© 2018 Asian Pacific Prostate Society. Published by Elsevier Korea LLC. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

1. Introduction

Lower urinary tract symptoms (LUTS) are common urologic complaints in male patients with a benign prostate obstruction. An epidemiologic study showed that LUTS could be found in 72.3% of Western men aged between 40 and 95 years. The international prostate symptom score (IPSS), first published in 1992 by The American Urologic Association, is a globally used questionnaire. The aims of this questionnaire are to evaluate the symptoms and to determine the severity of LUTS by converting subjective symptoms into an objective scoring system. The total calculated as a result of the IPSS can also be used in longitudinal follow-up to assess treatment efficacy. To date, the IPSS is translated and validated in multiple languages across the world.

Theoretically, the IPSS was designed to be an easy, self-administered questionnaire. However, some studies showed that successful completion of an IPSS would require at least grade 6 reading level to understand the questions, and up to 77.5% of low-educated patients were unable to completely fill in an IPSS. Therefore, many patients would often need assistance to complete the questionnaire which could result in a bias in the patients’ interpretation and responses to the IPSS questionnaire.

The visual prostate symptom score (VPSS) is a new alternative scoring system which was developed by A. E Groeneveld et al from South Africa. Recent studies demonstrated that the results

* Corresponding author.
E-mail address: vsetthawong@gmail.com (V. Setthawong).
of a VPSS show a significant correlation with the IPSS and can be completed without assistance, requiring less time especially in low literacy patients. The VPSS also correlates more significantly with urine flow rate than an IPSS. One study showed that the VPSS might be utilized in the longitudinal follow-up assessment of changes in symptom severity and evaluation of treatment efficacy.  

The IPSS had already been translated and validated into the Thai language. However, due to the fact that Thailand is a developing country, many patients, especially the elderly, are low educated. Views have been expressed by these patients that the IPSS is difficult to understand and that they are unable to complete it by themselves. Thus, the VPSS may be a good alternative to overcome this problem and ideally it should be able to replace the IPSS in clinical practice. Our authors believe that the VPSS could replace the IPSS but only if it could assess the symptoms and severity of LUTS by dividing them into mild, moderate, and severe symptoms. The rationale behind this reasoning is that treatment options differ between each severity subgroup, therefore only proving a correlation to the IPSS results may not fulfill this objective. Unfortunately, there is no data to support the ability of the VPSS, and the cut-off point of VPSS for each severity group is not yet established although it is available for the IPSS. Also limited data are available regarding the applicability of the VPSS in Thai population.

The objectives of this study have primary and secondary endpoints. The primary endpoints are (1) to evaluate the correlation between the VPSS, IPSS, and uroflowmetry parameters in Thai men and (2) to compare the accessibility of self-completion and understanding of each symptom score system between low and high-educated patients. The secondary endpoint is to establish a VPSS severity cut-off point by comparing results to the IPSS severity score system.

2. Materials and methods

This multicenter study was conducted at Lerdsin hospital in Bangkok and Maharaj Nakorn Chiang Mai Hospital in Chiang Mai, northern Thailand. The Institutional Ethics Committee of Lerdsin Hospital approved this prospective cohort study. From 1st February to May 2016, 200 male patients who visited the two urologic departments were enrolled to the study.

The sample size for this study was calculated using a 47.9% prevalence of male LUTS in the general population and 95% confidence interval. From this calculation, a minimum of 153 patients must be enrolled. Two hundred male patients enrolled to this study ensured the sample size was maintained despite the possibility of any lost data for whatever reason.

All of the patients were asked to fill in both an IPSS and a VPSS questionnaire independently. Assistance was provided only when the patient requested it. The VPSS consists of 4 questions: Q1: force of urine stream; Q2: frequency; Q3: nocturia; and Q4: quality of life. The VPSS severity score is defined using the sum of the Q1 to Q3 score. In addition to the completion of both questionnaires, an additional question was added: “Which questionnaire do you feel that is easier to understand, the IPSS or the VPSS?”

Prostate size was measured by transrectal ultrasonography or transabdominal ultrasound after digital rectal examination. Maximal flow rate, mean flow rate, and voided volume were accessed by uroflowmetry (Danflow 1100, Dantec Dynamics Ltd, Bristol, UK). Postvoided residual volume was also measured by bladder scan (Cubescan Biocon-500, Mcube Technology, Seoul, Korea). Demographical details include age, level of education, occupation, and monthly income were collected. Patients were divided into low education (≤primary school) and high education (≥high school) group.

Patient demographic characteristics were analyzed using descriptive statistics. The $\chi^2$/Fisher’s exact test was performed to compare categorical variables such as level of education, which may be important factors related to completing and understanding the IPSS and VPSS questionnaires. Pearson correlation coefficient ($r$)/Spearman’s rank correlation coefficient was used to evaluate the correlation between the VPSS and IPSS, urodynamic parameters, and prostate size. A $P < 0.05$ was accepted as statistically significant.

The sensitivity and specificity of presumed VPSS severity score ranges which may be used to define the severity of symptoms were evaluated by comparing results to the IPSS data as a gold standard reference.

### Table 1
Demographic characteristics of the patients.

| Level of education | Low-education level | High-education level | $P$ |
|--------------------|---------------------|----------------------|-----|
|                    | No education | Primary school | High school | Bachelor degree | Master degree | Doctoral degree |
| Number of patients (%) | 1 (0.50) | 59 (29.65) | 95 (47.74) | 29 (14.57) | 13 (6.52) | 2 (1.01) | -- |
| Mean age (years) | 81.0 | 64.8 | 60.3 | 60.5 | 60.0 | 52.0 | 0.013 |
| Median income per month (USD) | None reported | 300 | 500 | 666 | 1300 | 1333 | 0.0001 |

### Table 2
Mean total IPSS, total VPSS, symptom subscore of the patients and correlation coefficient ($R$) between IPSS and VPSS.

| Symptom score | Mean IPSS | Mean VPSS | Coefficient ($R$) | $P$ |
|---------------|-----------|-----------|-------------------|-----|
| Total score   | 14.4      | 9.61      | 0.493             | <0.001 |
| Q4d score     | 2.50      | 2.43      | 0.738             | <0.001 |
| Voiding symptom score (IPSS Q1, 3, 5, 6 vs. VPSS Q1) | 7.14 | 3.01 | 0.410 | <0.001 |
| Storage symptom score (IPSS Q2, 4, 7 vs. VPSS Q2, 3) | 6.23 | 6.61 | 0.417 | <0.001 |
| Frequency score (IPSS Q2 vs. VPSS Q2) | 1.94 | 4.12 | 0.183 | 0.015 |
| Nocturia score (IPSS Q7 vs. VPSS Q3) | 2.57 | 2.49 | 0.745 | <0.001 |

IPSS, international prostate symptom score; VPSS, visual prostate symptom score; Q4d, quality of life; Q, question.
of patients were able to complete the IPSS without any assistance while only 61.3% completed the VPSS (P = 0.001). Comparing the low and high education group, the low-educated group had a statistically significant lower self-completion rate of both the IPSS and VPSS (Table 5, P < 0.001). Seventy-five percent of all patients were able to complete the IPSS without any assistance while only 61.3% completed the VPSS unaided (P < 0.001).

### Results

A total of 200 men were enrolled from 1st February to 31st May 2016. The mean age of patients was 61.2 years, the range being 18–98 years. Patients were subdivided into low and high-educated subgroups according to their educational status. Patients who had no formal schooling or only went to primary school (grade 6 education) were defined as low education while others were classed as highly educated. Numbers, income, and mean age of each subgroup are shown in Table 1. Ninety-five percent of patients were able to read and understand Thai language. The majority of patients in this study were well-educated (69.9% vs. 30.1%). Patients in the low-educated group had a statistically significant lower self-completion rate of 50.4% (P < 0.001) comparing this to the standard IPSS value are shown as Table 6. The mean age of patients was 61.2 years, the range being 70.2% of patients in this study had moderate symptoms (19.4%) and 18 (10.3%) of patients had mild and severe symptoms, respectively. The mean scores for IPSS and VPSS were 14.4 and 9.61, respectively. Seventy-two percent of patients in this study had moderate symptoms (19.4%) and 18 (10.3%) of patients had mild and severe symptoms, respectively. The mean scores for IPSS and VPSS were 14.4 and 9.61, respectively. Seventy-two percent of patients in this study had moderate symptoms (19.4%) and 18 (10.3%) of patients had mild and severe symptoms, respectively.
and all individual scores apart from the frequency score. In contrast, however, several previous studies showed a fair correlation of frequency score between questionnaires\(^6\),\(^7\),\(^8\),\(^9\), whereas in our study there is a very poor correlation of frequency score \((r = 0.183, P = 0.015)\). This may be because there are imperfections in both questionnaires when it comes to assessing frequency. We noted that Q2 of the VPSS may overestimate frequency symptoms since urinating six times during the day is generally accepted as normal but would result in the highest score \((a score of 6)\) which would be interpreted as a very bad symptom. Additionally, in clinical practice, a single daytime urination would not be considered normal. There was only one patient in our study who reported “1” in Q2 of the VPSS. For these reasons, we felt this question should be modified to better reflect real life situations.

Our study showed that the VPSS has a higher correlation with some objective uroflowmetry parameters than IPSS although these correlations are weak. They include uroflow rate, residual urine, and prostate size. These results are comparable with previous studies\(^7\),\(^8\),\(^9\). This phenomenon may be the result of the Q1 pictogram in the VPSS which helps patients to recognize the urine flow more precisely than does the IPSS.

Unlike many previous studies which reported that a greater percentage of low educated patients could complete the VPSS without any assistance\(^13\),\(^14\) surprisingly our study reported an inverse result. A lower proportion of low-educated patients could complete the VPSS without any assistance than the IPSS \((41.6\% \text{ vs. } 61.2\%)\) this was also found to be the case in high-educated patients. This may be the result of many low-educated patients not understanding what the pictograms in the VPSS meant. This uncertainty meant they asked for assistance. Meanwhile highly educated patients felt the VPSS is easier to understand than the IPSS. This result may be due to Thai language being the only single national language in Thailand. This may explain the fact that low-educated patients who are literate can understand the meaning of each IPSS question easily. In contrast, for pictograms in VPSS, it may be difficult to interpret the meaning of each picture. So the VPSS may be more difficult to be understood by low-educated patients in Thailand. Nevertheless, the alteration of responses to VPSS was significantly less than alterations in the IPSS when receiving assistance.\(^14\) Therefore, the VPSS may still be useful in a country with a single national language and a more literate population.

To date our study is the first research to examine the possibility of establishing a VPSS severity score classification by comparing the outcomes to the gold standard IPSS severity system. We found that a VPSS of less than 6 or greater than 14 had a high specificity to correlate with mild \((\leq 7)\) or severe IPSS \((\geq 20)\). Meanwhile a VPSS between 7 and 13 had a very high sensitivity but low specificity to correlate with mild \((\geq 7)\) or severe IPSS \((\geq 14)\). This may be because the VPSS pictograms are more difficult to understand for low-educated patients. As regards the severity assessment, items \(\leq 6, 7\) to 13, and \(\geq 14\) from the VPSS may be used to indicate mild, moderate, and severe symptoms but further modification would improve its accessibility and therefore increase its reliability and feasibility in clinical practice.

Conflicts of interest

No conflict of interest relevant to this article was declared.

Acknowledgment

Our authors would like to thank Mrs. Joan Peagam, Medical & Scientific English Language Consultancy, for language editing as well as Mrs. Chantip Juntakarn and Ms. Waranya Tasomboon for their assistance with the statistical analysis.

References

1. Coyne KS, Sexton CC, Thompson CL, Milsom I, Irwin D, Kopp ZS, et al. The prevalence of lower urinary tract symptoms (LUTS) in the USA, the UK and Sweden: results from the Epidemiology of LUTS (EpiLUTS) study. BJU Int 2006;104:352–60.
2. Barry MJ, Fowler Jr FJ, O’Leary MP, Bruskewitz RC, Holmgren HL, Mebust WK, et al. The American Urological Association symptom index for benign prostatic hyperplasia. The Measurement Committee of the American Urological Association, J Urol 1992;148:1540–7.
3. Afriansyah A, Gani YI, Nusali H. Comparison between visual prostate symptom score versus the international prostate symptom score in patients with lower urinary tract symptoms. Prostate Int 2011;7:47–52.
4. Rodrigues Netto Jr N, de Lima ML, de Andrade EF, Apuzzo F, da Silva MB, Davidzon IM, et al. Latin American study on patient acceptance of the International Prostate Symptom Score (IPSS) in the evaluation of symptomatic benign prostatic hyperplasia. Urology 1997;49:46–9.
5. Park YW, Lee JH. Correlation between the visual prostate symptom score and international prostate symptom score in patients with lower urinary tract symptoms. IntNeuroUrol J 2014;18:37–41.
6. Nontakae K, Kochakhan W, Kijvika K, Viseeshinsh W, Silpakit C. Reliability of a Thai version of the International Prostate Symptom Score (IPSS) for the Thai population. J Med Assoc Thai 2014;97:615–20.
7. van der Walt CL, Heyns CF, Groeneveld AE, Edlin RS, van Vuuren SP. Prospective comparison of a new visual prostate symptom score versus the international prostate symptom score in men with lower urinary tract symptoms. Urology 2011;78:17–20.
8. Wessels SG, Heyns CF. Prospective evaluation of a new visual prostate symptom score, the international prostate symptom score, and uroflowmetry in men with urethral stricture disease. Urology 2014;83:220–4.
9. Heyns CF, Steenkamp BA, Chiswo J, Stellmacher GA, Fortsch HE, Van der Merwe A. Evaluation of the visual prostate symptom score in a male population with great language diversity and limited education: a study from Namibia. S Afr Med J 2014;104:253–7.
10. Ceylan Y, Gunlusoy B, Degirmenci T, Kozacigolu Z, Bolat D, Minareci S. Is new visual prostate symptom score useful as International Prostate Symptom Score in men with lower urinary tract symptoms: a prospective comparison in Turkish society. Urology 2015;85:653–7.
11. Afriansyah A, Gani YI, Nusali H. Comparison between visual prostate symptom score and international prostate symptom score in males older than 40 years in urban Indonesia. Prostate Int 2014;2:176–81.
12. Seleke. RE, Harris CR, Filippou P, Chi T, Alwaal A, Blaschko SD, et al. Validation of a visual prostate symptom score in men with lower urinary tract symptoms in a Health Safety Net Hospital. Urology 2015;86:334–8.
13. Roy A, Singh A, Siddhu DS, Jindal RP, Malhotra M, Kaur H. New visual prostate symptom score versus international prostate symptom score in men with lower urinary tract symptoms: a prospective comparison in Indian rural population. Niger J Surg 2016;22:111–7.