Original Article

Correlation between International Prostate Symptom Score and Uroflowmetry in Patients with Benign Prostatic Hyperplasia

CK Oranusi, AE Nwofor, O Mbonu

Department of Surgery, Nnamdi Azikiwe University/ Nnamdi Azikiwe University Teaching Hospital, Nnewi, Anambra State, Nigeria

ABSTRACT

Objective: To determine the correlation between severity of symptoms using the International Prostate Symptom Score (IPSS) and uroflowmetry in patients with lower urinary tract symptoms-benign prostatic hyperplasia (LUTS-BPH). **Patients and Methods:** We prospectively collected data from 51 consecutive men, who presented with LUTS-BPH at the Nnamdi Azikiwe University Teaching Hospital, Nnewi, Nigeria, from January 2012 through December, 2014. Symptom severity was assessed using the self-administered IPSS questionnaire. We also performed uroflowmetry using the Urodyn 1000 (Dantec, serial no. 5534). **Results:** The mean age of the patients was 67.2 ± 9.7 years (range 40-89 years). The most common presenting IPSS-LUTS was nocturia (100%) followed by urinary frequency (98%), straining (92.0%), weak stream (84.3%), urgency (41.2%), incomplete voiding (39.2%), and intermittency (35.3%) Most of the patients had moderate symptoms (58.8%) on IPSS with a mean value of 13.5 ± 3.0. The mean Qmax was 15.6 ± 18.7 mL/s and the mean voided volume was 193.0 ± 79.2 mL. About one-third of the patients (39.2%) had an unobstructed flow pattern based on Qmax. Correlation analysis showed a weak correlation between IPSS and voiding time ($r = 0.220$, $P > 0.05$), flow time ($r = 0.128$, $P > 0.05$), and time to maximum flow ($r = 0.246$, $P > 0.05$). These correlations were not significant ($P > 0.05$). IPSS showed a negative correlation with maximum flow rate ($r = 0.368$; $P < 0.0075$), average flow rate (-0.203, $P > 0.05$), and voided volume ($r = -0.164$, $P > 0.05$). This negative correlation was significant for maximum flow rate. **Conclusion:** Correlation between IPSS and *Q*max was negative but statistically significant. This implies that an inverse relationship exists between IPSS and *Q*max, and remains the only important parameter in uroflowmetry. There was no statistically significant correlation between IPSS and the other variables of uroflowmetry.

Keywords: *Benign prostatic hyperplasia, lower urinary tract symptoms, uroflowmetry, symptom severity*

Acceptance Date: 23-07-2016

Introduction

Benign prostatic hyperplasia (BPH) is a common cause of bladder outlet obstruction (BOO) in the male geriatric population.[1] Lower urinary tract symptoms (LUTS) suggestive of BPH are common complex clinical problems, especially in men above the age of 50 years.[2] The prevalence of BPH increases with age and results in LUTS in about 10% of elderly men.[1] BPH causes morbidity through the urinary symptoms with which it is associated. These symptoms can be very bothersome and impact substantially on the patient's quality-of-life (QoL).[3] Symptom severity strongly correlates with the overall health status of the patient and thus underscores the importance of symptom assessment in men with the disease. The degree of bothersomeness may be dramatically different for different patients with the same degree of symptom severity.[4] Majority of men with BPH undergo surgery to relieve bothersome urinary symptoms and improve QoL.[5]

Several symptom scoring systems have been developed to assess the degree of symptom severity.[6] These symptom scoring systems are not diagnostic of BPH,

Access this article online

Quick Response Code:

Website: www.njcponline.com

DOI: 10.4103/1119-3077.196120

Address for correspondence: Dr. Oranusi Chidi Kingsley,Urology division, Department of Surgery, Nnamdi Azikiwe University/ Nnamdi Azikiwe University Teaching Hospital, P.M.B Nnewi, Anambra State, Nigeria. E-mail: chidex30@yahoo.co.uk

How to cite this article: Oranusi CK, Nwofor AE, Mbonu O. Correlation between international prostate symptom score and uroflowmetry in patients with benign prostatic hyperplasia. Niger J Clin Pract 2017;20: 454-8.

but are valid tools for objectively assessing patients' symptoms, deciding choice of treatment for patients with LUTS-BPH and monitoring effects of any intervention procedure. The most widely used scoring system is the International Prostate Symptom Score (IPSS), developed by the American Urological Association (AUA) and adopted by the World health Organization (WHO).[7]

Uroflowmetry has been added to the assessment tools for patients with BPH. Like the IPSS, it is not diagnostic of BPH, but also gives an insight into the degree of obstruction caused by the benign prostatic enlargement (BPE). When combined with IPSS, it could offer improved sensitivity in the diagnosis of BOO due to prostatic enlargement.

This study was aimed at determining the correlation of IPSS results and uroflowmetry in patients with LUTS-BPH.

Patients and Methods

After obtaining approval from our institutional ethics committee and adequately informed patient consent, we prospectively collected data from 51 consecutive men, who presented with LUTS-BPH at the Nnamdi Azikiwe University Teaching Hospital, Nnewi, Nigeria, from January 2012 through December, 2014.

Target group were men above 40 years presenting with LUTS-BPH. Diagnosis of BPH was by a complete medical history, physical examination including Digital rectal examination, urinalysis and culture, prostate scan, and serum prostate-specific antigen to exclude the presence of prostate cancer.

Study Design

Symptom severity was reviewed using the self-administered IPSS questionnaire. Relevant biodata and duration of symptoms were obtained from patients. Uroflowmetry was also performed using the Urodyn 1000 (Dantec, serial no. 5534). Patients were instructed to void only when they have a strong urge to void. To ensure consistency, three flow rate recordings were obtained from each patient at intervals of 1 week and the average recorded for each patient. Voided urine volumes greater than or equal to 150 mL was used for the study. The machine works on the principle of rotational velocity which is kept constant by a tachometer and feedback circuit. As urine hits the rotating disk, more electrical energy is required to maintain the constant angular velocity and measurement of the extra current can be plotted graphically.

Statistical Analysis

Values were expressed as means with standard deviation for quantitative variables. The *Z*-test was used for comparison between groups based on their means. The Pearson correlation coefficient was used to assess correlation. *P*-values <0.05 were regarded as statistically significant. All statistical analysis was carried out using SPSS statistical package, 20.0 for Windows (SPSS Inc, Chicago, IL).

Results

A total of 51 patients were recruited for the study. Table 1 lists the patient clinical characteristics. The mean age of the patients was 67.2 ± 9.7 years (range 40-89 years).

Table 1: Clinical characteristics of patients with LUTS-BPH

Variable	*n* (%)	Mean ± SD (range)
Age (years)	51	67.2 ± 9.7 (40-89)
Serum PSA level (ng/mL)		
0-4	28.0 (54.9)	
4.1-10	17.0 (33.3)	
10.1-20	6.0 (11.8)	
IPSS		
Mild (0-7)	12 (23.5)	6.8 ± 1.8
Moderate (8-19)	30 (58.8)	13.5 ± 3.0
Severe (20-35)	9 (17.6)	23.8 ± 4.6
QoL index 4.3 ± 1.13		
Uroflowmetry		
Voided volume (mL)		193.0 ± 79.2
Maximum flow rate (Q_{max}, mL/s)		15.6 ± 18.7
Mean voiding time		44.7 ± 18.1
Flow time		38.0 ± 14.2
Average flow rate (Q_{ave})		5.9 ± 3.3
Time to maximum flow		9.5 ± 4.6

Table 2: Degree of obstruction based on Q_{max}

Category	No. (*n*)	Percentage (%)
Unobstructed (>15 mL/s)	20	39.2
Equivocal (10-14 mL/s)	14	27.5
Obstructed (<10 mL/s)	17	33.3
Total	51	100.0

Table 3: Results of correlation test

Test components	Correlation (*r*-value)	*Z*-value	*P*-value	Level of significance
IPSS/voiding time	0.220	1.552	0.1207	N.S.
IPSS/flow time	0.128	0.889	0.3741	N.S.
IPSS/Q_{max}	-0.368	-2.675	0.0075	S
IPSS/Q_{ave}	-0.203	-1.430	0.1528	N.S.
IPSS/voided volume	-0.164	-1.147	0.2513	N.S.
IPSS/T_{max}	-0.246	1.742	0.0815	N.S.

P-value < 0.05 – Statistically significant. N.S.–Not significant. S–Significant.

Fifty-five percent of the patients had PSA values within the normal range (0-4 ng/mL). The most common presenting IPSS-LUTS was nocturia (100%) followed by urinary frequency (98%), straining (92.0%), weak stream (84.3%), urgency (41.2%), incomplete voiding (39.2%), and intermittency (35.3%). Most of the patients had moderate symptoms (58.8%) on IPSS with a mean value of 13.5 ± 3.0. The mean QoL index was 4.3 ± 1.13. Uroflowmetry studies showed the mean Q_{max} to be 15.6 ± 18.7 mL/s and the mean voided volume was 193.0 ± 79.2 mL. About one-third of the patients (39.2%) had an unobstructed flow pattern based on Q_{max} [Table 2].

Table 3 shows the correlation analysis between IPSS and the various components of uroflowmetry. Correlation analysis showed a weak correlation between IPSS and voiding time (r = 0.220, P > 0.05), flow time (r = 0.128,P > 0.05), and time to maximum flow (r = 0.246, P > 0.05). These correlations were not significant (P > 0.05). IPSS showed a negative correlation with maximum flow rate (r = -0.368; P < 0.0075), average flow rate (-0.203,P > 0.05),and voided volume (r = -0.164, P > 0.05). This negative correlation was significant for maximum flow rate.

Discussion

LUTS can be due to mechanical obstruction to urine flow or due to bladder hypo-contractility. These pathophysiologic elements are all common in the elderly and may be present alone or in combination.[8] LUTS-BPH consists of BPE, BOO, and LUTS. However, patients with LUTS-BPH do not always share these components, and as such they do not show similar degree of symptoms.[9] Factors such as dynamic urethral resistance, prostate capsule, and anatomic pleomorphism rather than actual prostate size can influence severity of symptoms.[10] Many patients with LUTS-BPH will benefit from invasive procedures to remove the enlarged gland, some may not benefit from such treatments due to persistence of bothersome LUTS after surgery. It is therefore imperative that patients with LUTS be properly investigated and categorized based on the cause of LUTS. Objective symptom assessment using various symptom scoring systems, such as IPSS, uroflowmetry, and urodynamics, have proved very useful tools in the assessment of patients with LUTS-BPH before definitive treatment.

This study showed that most of our patients (58.8%) presented with moderate IPSS scores. Often patients attribute these urinary symptoms to changes in age and so fail to present until these symptoms become bothersome. Bothersome LUTS is significantly a leading indication for surgery in patients with LUTS-BPH. The mean QoL score for our patients was 4.13 ± 1.13, implying that most patients in this study were mostly unsatisfied with their symptoms at the time of presentation. Moderate to severe LUTS related to BPH have a 40% incidence among men in their 50s and are considered among the urologic conditions with the highest medical and social impact.[11-12] The most common symptom of LUTS from this study was nocturia (100%) followed by urinary frequency (98%) and straining to pass urine (92%). A survey of LUTS symptoms among Europeans showed that the most common symptom was nocturia (71%) similar to our finding, followed by incomplete emptying (59.9%) and urgency (58%), weak urinary stream (57%), and frequency (49.3%). The European study also found that the most prevalent combination of symptoms was the triad of nocturia, frequency, and a feeling of incomplete voiding.[13] A major difference between the countries

surveyed was recorded in the frequency rate: frequency was the most common symptom in France.[13] The researchers explained the differences in the prevalence of LUTS in Europe, by the larger proportion of patients with a recent diagnosis in the UK (fewer symptoms at the beginning of the disorder) compared with patients from France who had more patients diagnosed late. This difference in LUTS pattern seen in this study and the European study may be difficult to explain clinically. Late presentation, presence of co-morbidities, and attributing symptoms to aging rather than a disease process either alone or in combination may explain the differences.

Uroflowmetry electronically measures urine flow rate throughout the course of micturition. Like IPSS, the results of uroflowmetry are largely nonspecific for symptoms. However, the gold standard for the diagnosis of BOO is with urodynamics studies.[14] Uroflowmetry is a simple, accurate, and noninvasive method of assessing the dynamics of micturition.[15] For this reasons, it can be incorporated easily into the routine preoperative assessment of patients with LUTS. The most important parameter in uroflow study is the Q_{max}.[8,16] Shoukry *et al.*,[16] in their study, concluded that Q_{max} correlated well with the degree of prostatic obstruction. The average flow rate is less reliable and the other values are immaterial. The range of normal Q_{max} among Nigerian men has been previously determined from previous study by the same author. This ranges from >25 mL/s in men <40 years, >23 mL/s in those between 40 and 60 years, and >17 mL/s in men aged above 60 years.[17] In this study, the mean Q_{max} for patients with LUTS-BPH was 15.6 ± 18.7 mL. Traditionally, Q_{max} less than 10 mL/s indicate an obstruction and a Q_{max} greater than 15 mL/s indicates no obstruction. A Q_{max} between 10 and 14 mL/s is described as equivocal.[8] Significantly, most of our patients (39.2%) had unobstructed flow pattern, implying that some other factors other than mechanical obstruction maybe involved in their LUTS. There was a negative correlation between the IPSS scores and Q_{max}, Q_{ave}, and voided volume. However, the analysis was statistically more significant with Q_{max} (r = -0.368, $P < 0.05$). This implies that an inverse relationship exists between IPSS and Q_{max}. Several studies in the literature have compared symptom severity with obstructive indices due to BPH. Barry *et al.*[18] reported no correlation between severity of symptoms in men with prostatism due to BPH and prostate size, degree of bladder trabeculation, uroflowmetry, or postvoid residual urine. El Din *et al.*[19] evaluated the correlation between uroflowmetry, prostate volume, postvoid residue, and LUTS as measured by IPSS, and also concluded that the correlation between objective noninvasive parameters of lower urinary tract dysfunction and LUTS was weak. It may therefore be justified to say that uroflowmetry cannot be used to confirm the diagnosis of BPH in a patient with LUTS among Nigerian men and Q_{max} remains the only important parameter in uroflowmetry studies especially when compared to symptom severity.

Some limitations were observed during this study. First, patients were required to have three flow rate recordings and the average Q_{max} taken for each patient. Most patients did not return after one or two flow readings. This significantly affected the sample size for the study. Second, as the reliability of the urine flow test depended to some extent on the volume of urine passed, patients had to either stay in hospital for long durations to be able to void significant volumes of urine or the test postponed to another day to have a more accurate recording. Finally, there was also difficulty in patients' understanding and interpretation of the QoL variables on IPSS. Words like "pleased," "delighted," and "happy" could not be clearly delineated even in the local languages. This again may affect the result ratings. Nonetheless, this study offers useful information to expand current knowledge in the symptomatology and dynamics of micturition in patients with LUTS-BPH.

Conclusion

Patients with LUTS-BPH should be properly investigated and managed to improve their symptoms. There was a negative correlation between severity of symptoms on IPSS and Q_{max}, Q_{ave}, and voided volume. The correlation between IPSS and Q_{max} was statistically significant. This implies an inverse relationship between IPSS and Q_{max}. There was no statistically significant correlation between IPSS and the other variables of uroflowmetry. Clinically, Q_{max} remains the only important parameter in uroflowmetry.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Berry SJ, Coffey DS, Walsh PC. The development of BPH with age. J Urol 1984;132:474-9.
2. Barry MJ. Evaluation of symptoms and quality of life in men with benign prostatic hyperplasia. Urology 2001;58:25-32.
3. Roger SK, McConnell J, Fast facts: Benign prostatic hyperplasia. UK Staples Printers 1995;7.
4. Girman CJ, Jacobson SJ, Guess HA. Natural history of prostatism: Relationship among symptoms, prostate volume, and peak urinary flow rate. J Urol 1995;153:1510-515.
5. Jonler M, Riechmann M, Bruskewitz RC. Benign prostatic hyperplasia. Current pharmaceutical treatment. Drugs 1994;47:66-8.

6. Hines JEW. Symptom indices in bladder outlet obstruction. BJU 1996;77:494-1.
7. Cockett ATK, Aso Y, Chatelain C. The international consultation on benign prostatic hyperplasia, Paris 1991. Jersey: Scientific International. 1991.
8. Nordling J. Curriculum in urology, urodynamics including incontinence and BPH: Urodynamics of BPH. Eur Urol 1998;34:1-8.
9. Oelke M, Bachmann A, Descazeaud A. EAU guidelines on treatment and follow-up of non-neurogenic male lower urinary tract symptoms including benign prostatic obstruction. Eur Urol 2013;64:118-40.
10. Vesely S, Knutson T, Damber JE. Relationship between age, prostate volume, prostate-specific antigen, symptom score and uroflowmetry in men with lower urinary tract symptoms. Scand J Urol Nephrol 2003;37:322-28.
11. Oesterling JE. Benign prostatic hyperplasia: a review of its histogenesis and natural history. Prostate Suppl 1996;6:67-73.
12. Richard F, Lukacs B, Jardin A. Results of an epidemiologic surgery carried out with men 50-80 years of age to study urinary disorders, quality of life and sexual function. Prog Urol 2001;11:250-63.
13. Montorsi F, Mercadante D. Diagnosis of BPH and treatment of LUTS among GPs: A European survey. Int J Clin Pract 2013;67:114-9.
14. Nitti VW. Pressure flow urodynamic studies: The gold standard for diagnosing bladder outlet obstruction. Rev Urol 2005;7:S14-21.
15. Abrams PH. Prostatism and prostatectomy: The value of urine flow rate measurement in the preoperative assessment for operation. J Urol 1977;117:70-71.
16. Shroukry I, Susset JG, Moustafa M. Role of uroflowmetry in the assessment of lower urinary tract obstruction in adult males. BJU 1975;47:559-566.
17. Oranusi CK, Nwofor AME, Orakwe JC, Mbonu OO. Determination of normal urine flow rates in adults at Nnewi; Preliminary report. Nig J Surg 2005;11:44-6.
18. Barry M, Coccket A, Holtgroove EN. Relationship of symptoms of prostatism to commonly used physiological and anatomical measures of severity of BPH. J Urol 1993;150:351-58.
19. El Din KE, Kiemeney L, Wildt MD, Debruyne FMJ, De La Rosette JMC. Correlation between uroflowmetry, prostate volume, postvoid residue, and lower urinary tract symptoms as measured by the international prostate symptom score. Urology 1996;48:393-97.