Original Article

Correlation between Uroflowmetry and International Prostate Symptoms Score in the evaluation of Nigerian men with Benign Prostatic Enlargement

Victor Abhulimen[1], *John Edoka Raphael[1]
Urology Division, Department of Surgery, University of Port Harcourt Teaching Hospital, Port Harcourt, Rivers, Nigeria.

Abstract

Background: Benign prostatic enlargement (BPE) may obstruct the urethra, reduce urine flow, and cause Lower Urinary Tract Symptoms (LUTS). Patients with LUTS can be evaluated with the International Prostate Symptom Score (IPSS) and uroflowmetry for diagnosis, treatment selection, and monitoring. There are challenges, especially in developing countries with these two investigative modalities. A level of education is needed to fill the IPSS form while most centres do not have a uroflowmeter. Studies to evaluate the relationship and compare the beneficial value of IPSS and uroflowmetry are few.This study aims to assess the correlation between IPSS and uroflowmetry in adult patients who present with LUTS secondary to BPE and compare their beneficial values.

Methodology: The study was a hospital-based, descriptive prospective cross-sectional study of patients with LUTS secondary to BPE. Ethical committee approval and informed consent were obtained. Every patient had the study questionnaire and IPSS questionnaire completed. Each patient also had uroflowmetry performed. The researcher filled out the study questionnaire. Data were coded and entered using Microsoft Excel version 2010 and transferred into Statistical Package for Social Sciences Version 20 for analysis.

Results: Two hundred eighty-six patients were evaluated, but 100 met the inclusion criteria and were included in the study. The ages ranged from 48 to 93years with a mean age of 64.71± 9years. The 60 to 69 years age group had the highest frequency, 43(43%). The mean Total Prostate Volume (TPV) was 83±32.28ml. Most patients (65 patients) presented with severe LUTS (*p=0.001*).There was a statistically significant inverse relation between IPSS and Maximum Flow Rate (p=0.001; r= -0.624) and Average Flow Rate (p= 0,001; r= -0.578), indicating that the higher the degree of bother, the lower the Mean and Average Flow Rates. This suggests that the more the degree of bother from BPE as assessed by IPSS, the lower the urine flow rates on uroflowmetry.

Conclusion: There was a strong negative correlation between IPSS and MFR a moderate negative correlation between IPSS and AFR, showing that the higher the IPSS, the poorer the urine flow. IPSS can be used instead of the uroflowmetry to evaluate patients with BPE if a uroflowmeter is unavailable.

Keywords: Benign Prostatic Hyperplasia; BPH; IPSS; Uroflowmetry.

Introduction

Prostatic enlargement and other causes of bladder outlet obstruction may reduce the rate of urine flow from the bladder and cause Lower Urinary Tract Symptoms (LUTS). Patients with LUTS need to be evaluated before, during, and after therapy to ascertain their response to that therapy. One objective method of assessing patients with LUTS is uroflowmetry. Uroflowmetry is a simple, non-invasive test that can aid the diagnosis and monitoring of patients with these symptoms.[1] It gives information about hesitancy, voided volume, maximum flow rate, average flow

Corresponding Author: *John Edoka Raphael
Urology Division, Department of Surgery, University of Port Harcourt Teaching Hospital, Port Harcourt, Rivers, Nigeria
drraphaeljohn@gmail.com

Access this article online

Quick Response Code:

Website: www.nigerianmedjournal.org

How to cite this article: Abhulimen V, Raphael JE. Correlation between Uroflowmetry and International Prostate Symptoms Score in the evaluation of Nigerian men with Benign Prostatic Enlargement. Niger Med J 2021; 62; (5): 219-225

rate, voiding time, flow time, and time to maximum flow rate.

Another method of assessing the occurrence and severity of LUTS is using a validated symptom score like the International Prostate Symptom Score (IPSS).[2,3] It was derived from the American Urological Association (AUA) 7 score described by Barry and his colleagues in 1992.[3] Although there are other methods of assessing symptom score,[4-8] the IPSS has become the international standard.[3] It is a method of quantifying LUTS. It is also helpful for patients' evaluation, treatment stratification, counselling, and follow-up.[9,10]

IPSS consists of three storage symptoms (frequency, urgency, and nocturia), four voiding symptoms (poor stream, intermittency, straining, and feeling of incomplete voiding) and a question relating to the Health-Related Quality of Life (HRQOL). The quality of life is scored from 0 to 6. Each symptom is scored on a scale of 0- 5.Thus, the score can range from 0- 35. A symptom score 0-7 is considered mild, 8-19 is considered moderate, and 20-35 is considered severe.[10,11] IPSS assessment is readily available, does not require any device, and may come at no extra cost to the patient.

Various studies have beenconducted to assess the correlation between IPSS and uroflowmetry with conflicting results.[12-21]The study aims to evaluate the relationship between IPSS and uroflowmetry in male patients with LUTS in Port Harcourt, Nigeria.

Materials and Methods

This prospective hospital-based descriptive cross-sectional study involved adult male patients with LUTS secondary to BPE at the University of Port Harcourt Teaching Hospital, Port Harcourt, Rivers State, Nigeria. Inclusion criteria were male patients with benign prostatic enlargement on digital rectal examination 9DRE, serum PSA less than 4ng/ml,normal PSA density<0.15ng/ml^2, and normal findings on the Transrectal ultrasound scan. Patients on the catheter, previous surgery in the lower urinary tracts, patients with a predisposition to neurological bladder dysfunction like Parkinson's disease, disorders of the spine, urethral stricture, patients with LUTS from BPE who are on medical therapy were excluded from the study. All consenting patients who met the inclusion criteria were recruited to the study. The study questionnaire and IPPS form were administered to the study subjects. Uroflowmetry was performed for each patient, and the result was noted. The entries from the IPSS forms and research questionnaire were collated. Data were coded and entered using Microsoft Excel ® version 2010 and transferred into the Statistical Package for Social Sciences (SPSS) version 20 for analysis. Chi-square ($P<0.05$) and correlation analysis were used to test associations and relationships. Ethical approval was obtained from the Research and Ethics Committee of the University of Port Harcourt Teaching Hospital, Port Harcourt, and written informed consent was obtained from each patient before enrollment into the study.

Results

Two hundred eighty-six patients were evaluated, but 100 met the inclusion criteria and were included in the study. The ages ranged from 48 to 93years with a mean age of 64.71± 9years. The 60 to 69 years age group had the highest frequency, 43(43%).The mean duration of symptoms was 3.21±2.39 years. The mean Total Prostate Volume (TPV) was 83±32.28ml. Most patients (65 patients) presented with severe LUTS (*p=0.001*). There was a statistically significant inverse relation between IPSS and Maximum Flow Rate (p=0.001; r= -0.624) and Average Flow Rate (p= 0,001; r= -0.578), indicating that the higher the degree of bother, the lower the Mean and Average Flow Rates. This suggests that the more the degree of bother from BPE as assessed by IPSS, the lower the urine flow rates on uroflowmetry.

Table 1: Sociodemographic characteristics of patients

Characteristics	Frequency (n=100)	Percentage (%)
Age group		
<50	4	4.0
50-59	43	25.0
60-69	25	43.0
70-79	20	20.0
⩾80	8	8.0
Mean Age		*64.71 ± 9.75 yrs*

Table 2: Severity of the patients' symptoms assessed with the IPSS questionnaire

Total IPSS	Frequency (n=10)	Percentage (%)	Chi-square ($\chi 2$), p-value
Mild symptom (1-7)	0	0.0	
Moderate symptom (8-19)	35	35.0	18.0 (0.001)*
Severe symptom (20-35)	65	65.0	
Mean IPSS			22.13 ± 6.34

*Statistically significant (p<0.05)

Table 3: The mean uroflowmetry variables in patients

Uroflowmetry Variables	Mean ± SD
Maximum Flow Rate (MFR)	12.07±6.65
Average Flow Rate (AFR)	5.91±3.50
Voiding Time (FT)	60.11±18.39
Time to Maximum Flow Rate (TMFR)	8.10±3.11
Voided Volume	248.70±73.91

Table 4: To assess the relationship between uroflowmetry and IPSS using the Pearson correlation coefficient analysis

Uroflowmetry variables	IPSS	
Maximum Flow Rate (MFR)	The Pearson correlation coefficient, r	-0.624
	R-Square (r^2)	0.39
	p-value	0.001*
	95% CI	-0.744 – (-0.446)
Average Flow Rate (AFR)	The Pearson correlation coefficient, r	-0.578
	R-Square (r^2)	0.33
	p-value	0.001*
	95% CI	-1.344 – (-0.751)
Prostate Volume (PV)	The Pearson correlation coefficient, r	0.07
	R-Square (r^2)	0.15
	p-value	0.064
	95% CI	0.041-1.113
Flow Time (FT)	The Pearson correlation coefficient, r	0.525
	R-Square (r^2)	0.28
	p-value	0.06
	95% CI	0.22-1.240
Time to Maximum Flow Rate (TMFR)	The Pearson correlation coefficient, r	0.576
	R-Square (r^2)	0.33
	p-value	0.071
	95% CI	0.427-1.767
Voided Volume (VV)	The Pearson correlation coefficient, r	-0.408
	R-Square (r2)	0.166
	p-value	0.062
	95% CI	-1.051- (-0.219)

**Statistically significant (p<0.05)*

Table 5: Correlation between Quality of Life (QoL) and IPSS

	IPSS	
Quality of Life (QoL)	The Pearson correlation coefficient, r	0.227
	R-Square (r^2)	0.051
	p-value	*0.023**
	95% CI	0.026-0.348

**Statistically significant (p<0.05)*

Table 6: To assess the relationship between MFR and AGE using the Pearson correlational coefficient analysis

Uroflowmetry variable	Age	
Maximum Flow Rate (MFR)	The Pearson correlation coefficient, r	-0.408
	R-Square (r^2)	0.10
	p-value	0.005*
	95% CI	-0.690 (-0.125)

**Statistically significant (p<0.05)*

Table 7: To assess the relationship between AFR and AGE using the Pearson correlational coefficient analysis

Uroflowmetry variable	Age	
Average Flow Rate (AFR)	The Pearson correlation coefficient, r	-0.314
	R-Square (r^2)	0.099
	p-value	0.001*
	95% CI	-1.405 (-0.345)

**Statistically significant (p<0.05)*

Discussion

Prostatic disorders often cause urinary problems in ageing men. The most common of these disorders is Benign Prostatic Enlargement (BPE).BPE is characterized by nonmalignant proliferation of cells in the periurethral and transitional zones of the prostate and can cause Bladder Outlet Obstruction (BOO).[2,8] The IPSS is the standard for assessing symptom severity and degree of bother. Patients with LUTS can be evaluated using IPSS and uroflowmetry. However, studies correlating LUTS using IPSS and uroflowmetry have been equivocal.[12,14-19]

In this study, the modal age group was 60 to 69 years, while the mean age was 64.71 ±9.75years. This mean age is similar to studies carried out by Agrawal and colleagues[23] with a mean age of 67.5years, Singla et al.[12] with a mean age of 67.7 years in India, Heynset al.[4] in South Africa with a mean age of 64yrs, and Oranusi and colleagues[20] in Nnewi, South-Eastern part of Nigeria with a mean age of 67.2years. Ojewola and colleagues, in the South Western part of Nigeria, also reported a mean age of 64.3± 12.6years.[24]

The mean duration of symptoms in this study was 3.21±2.39 years. The mean duration of symptoms in a study conducted in Nepal by Agrawal and colleagues[23] was 22.1 months. The late presentation of patients in this study can explain why they presented with severe symptoms.[25]

The mean IPSS in this study was 22.13±6.34, showing that many patients presented with severe symptoms [state that 65% of the patients in your study had severe IPSS scores]. This finding agrees with that reported by Agrawal and colleagues[23] with a mean IPSS 23.5±2.8 but at variance with studies by Liu et al.[26] and Ezz-elet al.[16] with a mean IPSS of 11.54±6.84 and 17.1±7.1 respectively.

Most patients (66%) presented with a QoL score of 5 or 6. This agrees with the study by Oranusi and colleagues[20] who had a QoL of 4.3±1.13. Agrawal and

colleagues[23] had a higher QoL of 5.2±0.6. Liu et al.[27] had a QoL of 3.37±1.36.

The mean TPV in this study was 83.02±32.28 cm^3. This was similar to the finding in the study by Badmus and colleagues[27] in Ile Ife, South-Western Nigeria, who had a mean TPV of 83.8±37.7cm^3. Udeh and colleagues[28] in a study conducted in Jos, had a mean prostate volume of 72.79±44.38cm^3. However, studies conducted in the Far East by Liu and colleagues[26] and studies in Europe by Dicuioet al. [29] had observed smaller mean total prostate volumes. This may not be surprising as a study indicated that Nigerians have a larger average normal prostate.[30]

The mean PSA in this study was 2.92±1.14ng/ml. This is similar to studies by Liu and colleagues[26] who had a mean PSA of 2.79±4.79ng/ml. This is at variance with the study result by Agrawal and colleagues[23] who had a PSA of 1.4±0.8ng/ml. However, the prostate volume in Agrawal's study is relatively small (42.5cm^3) compared to the mean TPV in this study of 83.02±32.28 cm.[3] The smaller prostate volume may account for the lower PSA value since larger glands have been associated with higher PSA values in BPE.[10]

This study showed a significant negative correlation between IPSS and Qmax. This implies that the more severe the LUTS, the lower the maximum flow rate and vice versa. The results of this study are not novel but help strengthen the study by Singla and colleagues.[12] Oranusiet al. [20] and Caikirogluet al. [18] noticed a significant negative moderate correlation between IPSS and Qmax. Other authors noticed a significant negative, weak correlation between IPSS and Qmax.[14,16,20] Wadie and colleagues[15] found no correlation between Qmax and IPSS. In the study by Wadie, the aetiology of LUTS was not clearly stated. Several diseases aside, BPE can present with LUTS. This present study considered only patients with BPE.

This study's Average Flow Rate (Qave) revealed a statistically significant moderate negative correlation with IPSS. This agrees with Itoh et al.[14] who noticed a statistically significant moderate but negative correlation between Qave and IPSS. Singla and colleagues[12]. Noticed a robust negative correlation between IPSS and Qave. Wadie and colleagues[15] observed a statistically significant weak negative correlation. Oranusiet al.[20] noticed a correlation between Qave and IPSS, though this was not statistically significant. A reason for the better correlation between Qmax, Qave, and IPSS maybe because the IPSS forms were physician-administered and not self-administered. This ensured a better understanding of the symptoms and easier completion of the IPSS questionnaires.

Johnson et al.[32] also observed that symptom scores were likely to be under-reported if self-administered (especially in patients with a low level of education) and more reliable if physician-administered. Patients not literate in English find it difficult to comprehend and complete the IPSS[9]. A study conducted in Western Nigeria by Abiola et al.[33] revealed that at least secondary level education is needed to complete the IPSS questionnaire. In this study, a patient had no formal education, and 30 had only primary level education. A third of the patients in this study may have had difficulty completing the questionnaire on their own if self-administered or may have under reported it, leading to an erroneous outcome.

Before carrying out the uroflowmetry, we ensured that the patient was relaxed and took the most representative reading of his normal void. Chan et al.[18] noticed that uroflowmetry at home correlated better with symptoms than at the clinic. Patients with BPE tend to void better when relaxed. This may be another reason for the strong negative correlation between IPSS and Qmax.

In assessing patients with BOO using uroflowmetry, Qmax is the most important parameter,[12,14,21] hence Qmax may be more reliable than Qave. Shoukry et al.[35] found maximum flow rate to be more sensitive than symptoms in assessing BOO. Uroflowmetry does not require the subject to be literate in English.

Other factors responsible for the varied correlation between Qmax, Qave, and IPSS depend on the level of obstruction at the bladder outlet, the configuration of the prostate[35] and the voided volume.[34] Heynset al.[4] observed a positive correlation between voided volume and Qmax. Although there was a positive correlation between voided volume and Qmax, it was not statistically significant.

Maximum flow rate can predict surgical outcomes. Patients with flow rates less than 15ml/second before surgical intervention have a better global outcome in the postoperative period.[34] Despite the advantages of uroflowmetry, it cannot differentiate between low flow due to bladder outlet obstruction and poor bladder compliance.[1] Flowrate also varies and may

differ as much as 5ml/second in a given day even when the voided volume is the same.[36] Uroflowmetry could also have artefacts like the wag effect that could affect the reading.[36] Uroflowmetry can objectively assess symptoms due to poor stream, but IPSS assesses poor stream and other signs and tells about QoL. Uroflowmetry cannot inform the urologist about QoL. In an adult, a voided volume of 125 to 150ml is required to interpret the uroflowmetry tracing [1,34] accurately, but no volume cut off is required to use the IPSS.

Uroflowmeter also comes at a cost and needs accessories like a co-mode chair, funnel, container, printer, paper, and batteries. These extra expenses are not required in using the IPSS. The IPSS, though subjective, is relatively cheaper compared to the uroflowmetry.

The IPSS and uroflowmetry both have their shortfalls. Some information can be obtained from the IPSS but not uroflowmetry, and some information can be obtained from the uroflowmetry, which are not contained in the IPSS. Hence, when available, some authors have opined that a combination of uroflowmetry and symptom scores improved outcomes after surgery. They believe that both are complementary.[19,32]

Conclusion

There is a negative correlation between IPSS and MFR,an inverse correlation between IPSS and AFR showing that the higher the IPSS, the poorer the urine flow. In resource-constrained settings without a uroflowmeter, the IPSS could be used instead of uroflowmetry for categorising patients with bladder outlet obstruction from BPE.

References

1. Chapple CR, MacDiarmid SA, Patel A. Urodynamics made easy. *Elsevier* 2009; **3**:28-38.
2. Barry MJ. Evaluation of symptoms and Quality of Life in men with benign prostatic hyperplasia. *Urology* 2001; **58**:25-32.
3. Roehrborn CG. Benign Prostatic Hyperplasia: Etiology, Pathophysiology, Epidemiology, and Natural History. In: Wein AJ, Kavoussi LR, Partin AW, Novick AC, Peters CA (Editors). *CampbellWalsh Urology*. 10th edition, Philadelphia, USA: Elsevier Saunders, 2012: 2570-2610.
4. Heyns CF, van der Walt CL, Groeneveld AE. Correlation between a new visual prostate symptom score (VPSS) and uroflowmetry parameters in men with lower urinary tract symptoms. *SAfr MedJ* 2012; **102:** 237-240.
5. Park YW, Lee JH. Correlation between the Visual Prostate Symptom Score and International Prostate Symptom Score in Patients with Lower Urinary Tract Symptoms. *Int Neurourol J* 2014; **18**:37–41.
6. Hansen BJ, Flyger H, Brasso K, Schlou J, Nordling J, ThorupAnderson J, et al. Validation of the self-administered Danish Prostatic Symptom Score (DAN-PSS-1) system for use in benign prostatic hyperplasia. *Br J Urol* 1995; **76**:451-458.
7. Homma Y, Yoshida M, Yamanishi T, Gotoh M. Core Lower Urinary Tract Symptom Score (CLSS) questionnaire: A reliable tool in the overall assessment of lower urinary tract symptoms Issue. *Int. JUrol* 2008; **15**: 816-820.
8. Angalakuditi M, Seifert RF, Hayes RP, O'Leary MP, ViktrupL. Measurement properties of the benign prostatic hyperplasia impact index in tadalafil studies. *Health Qual Life Outcomes* 2010; **8:**131-132.
9. Amu O C, Udeh E I, Ugochukwu A I, Dakum N K, Ramyil V M. The value of international prostate symptom scoring system in the management of BPH in Jos, Nigeria. *Niger J Clin Pract* 2013; **16**:273-278.
10. Yeboah ED. The prostate gland. In: Badoe EA, Archampong EQ, Rocha-Afodu JT, (editors). *Principles and practice of surgery including pathology in the tropics* 4th edition, Accra: Assemblies of God Literature Centre Ltd, 2009: 917- 952.
11. Berges R, Oelke M. Age-stratified normal values for prostate volume, PSA, maximum urinary flow rate, IPSS, and other LUTS/BPH indicators in the German male community-dwelling population aged 50 years or older. *World J Urol* 2011; **29**:171-178.
12. Singla S, Garg R, Singla A, "Sharma S, Singh J, Sethi P. Experience with Uroflowmetry in Evaluation of Lower Urinary Tract Symptoms in Patients with Benign Prostatic Hyperplasia. *J Clin Diagn Res* 2014; 8:1–3.
13. Weir I. Pearson'scorrelation.statstutor, 2013. Available at: http://ww.statstutor.ac.UK/resource{¯uploaded /Pearsons.pdf (Accessed 19 Nov.2017).
14. Itoh H, Kojima M, Okihara K, Ukimura O, Ushijima S, Kawaguchi A. Miki T. Significant

relationship of time-dependent uroflowmetric parameters to lower urinary tract symptoms as measured by the International Prostate Symptom Score. *Int J Uro*2006; **13**:1058 –1065.
15. Wadie BS, Ibrahim E-HI, de la Rosette JJ, Gomxa MA, Ghoneim MA. The relationship of the International Prostate Symptom Score and objective parameters for diagnosing bladder outlet obstruction. Part 1: when statistics fail. *J Urol* 2001; **165**:32–34.
16. Ezz-el DK, Kiemeney LA, de Wildt MJ, Debruyne FM, de la Rosette JJ. Correlation between uroflowmetry, prostate volume, postvoid residue, and lower urinary tract symptoms as measured by the International Prostate Symptom Score. *Urology* 1196; **48**:393-397.
17. Zambon JP, Batezini NS, Karam Junior EJ, Conceição RD, Carvalho MJA, Almeida FG. Uroflowmetry is a Large Population of Brazilian Men Submitted to a health checkup program and its correlation with IPSS and prostate size. *Int Braz j Urol* 2013; **1**:841-846.
18. Cakiroglu B, Gozukucuk R, Sinanoglu O, Akso SH, Tas T, Eyyupoglu SE, Uyanik BS. The correlation of symptoms severity and objective measures in patients with lower urinary tract symptoms. *J Clin Med Res* 2013; **2**:135-139.
19. Chan CK, Yip SK, Wu IP, Li ML, Chan NH. Evaluation of the clinical value of a simple flowmeter in the management of male lower urinary tract symptoms. *BJUI* 2012; **109**:1690-1696.
20. Oranusi C K, Nwofor A E, Mbonu O. Correlation between international prostate symptom score and uroflowmetry in patients with benign prostatic hyperplasia. *Niger J Clin Pract*2017; **20**:454-458.
21. Malomo TA, Adebayo SA, Takure AO, Anegbe A, Shittu OB, Okeke LI, Olapade-Olaopa EO. Correlation of the IPSS and quality of life with MMS® uroflowmetry in patients with LUTS in Ibadan, Nigeria. *Afr J Urol* 2014; **20**:111-112.
22. Araoye MO. Research methodology with statistics for health and social sciences. Ilorin, Nigeria: *Nathadex Publishers* 2003;120.
23. Agrawal CS, Chalise PR, Bhandari BB. Correlation of prostate volume with international prostate symptom score and quality of life in men with benign prostatic hyperplasia. *Nepal MedColl J* 2008; **10**:104-107.
24. Ojewola RW, Oridota ES,Balogun OS, Alabi TO, Ajayi AI, et al. Prevalence of clinical benign prostatic hyperplasia amongst community-dwelling men in a south-Western Nigerian rural setting: A cross-sectional study. *Afr J Urol* 2017; **23**:109-115.
25. Brieger WR, Osamor PE, Salami KK, Oladepo O, Otusanya SA. Interactions between patent medicine vendors and customers in urban and rural Nigeria. *Health Policy Plan*. 2004; **19**: 177– 182.
26. Liu CC, Wang CJ, Huang SP, Chou YH, Wu WJ, Huang CH. Relationship between American urological association symptom index, prostate volume and disease-specific quality of life in patients with benign prostatic hyperplasia. *Kaohsiung J. Med Sci* 2004; **20**:273-277.
27. Badmus TA, Asaleye CM, Badmus SA, Takure AO, Ibrahim MH, Arowolo OA. Benign prostate hyperplasia: average volume in southwestern Nigerians and correlation with anthropometrics. *Niger Postgrad Med J* 2012; **19**:15-18.
28. Udeh EI, Ozoemena OF, Ogwuche E. The relationship between prostate volume and international prostate symptom score in Africans with Benign prostatic hyperplasia. *Niger J Med* 2012; **21**:290-295.
29. Dicuio M, Pomara G, Vesely S et al. The use of prostatic Intravesical protrusion correlated with uroflowmetry: a new method to measure obstruction in patients with LUTS due to BOO without using P/Fstudies. *ArchItal Urol Androl* 2005; 77:50-53.
30. Okeji, MC, Okoye IJ, Nwobi IC, Okpaleke MS. Transrectal ultrasonographic assessment of prostate volume in normal adult Nigerians.[Online].Available at:http://www.njmirt.org/okeji_fullpaper_1_1.pdfAssessed 31 Jan 2018.
31. Akinboro A, Azeez MA, Bakare AA. Frequency of twinning in Southwest Nigeria. *Indian J Hum Genet* 2008;**14**:41-43.
32. Johnson TV, Schoenberg ED, Abbasi A. Assessment of the performance of the American Urological Association symptom score in 2 distinct patient populations. *J Urol*2009; **181**:230– 237.
33. Abiola OO, Ajape AA, Adeniyi SO, Ayeni SC. Use and ease of self-administered international prostate symptom score (IPSS) and visual prostate symptom score (VPSS) for assessment of lower urinary tract symptoms in Nigerian men. *Afr J Uro* 2016; **22**:121-126.

34. McConnell JD, Barry MJ, Bruskewitz RC. Benign prostatic hyperplasia: diagnosis and treatment. Agency for Health Care Policy and Research. *Clin Pract Guide l Quick Ref Guide Clin* 1994; **8**:1–17.

35. Shoukry I, Susset JG, Elhilali MM, et al. Role of uroflowmetry in the assessment of lower urinary tract obstruction in adult males. *Br J Urol*1975;**47**:559–566.

36. Reynard J, Brewster S, Biers S. Oxford *Handbook of Urology*. Third edition. UK: Oxford University Press, 2013: 74-76.