

Study of correlation between prostatic volume on ultrasonography and clinical symptoms using international prostate symptom score (IPSS) in cases of prostatomegaly

Anil Shriram Munde¹, Nandini Sateesh Desai^{2*}

¹Associate Professor, ²Junior Resident, Department of General Surgery, Vilasrao Deshmukh Government Medical College, Latur, Maharashtra, INDIA.

Email: dranilmunde@gmail.com, nansd5795@gmail.com

Abstract

Background: The International prostate symptom score (IPSS) is widely used to assess the severity of lower urinary tract symptoms (LUTS) in men with bladder outlet obstruction and to evaluate the response to medical or surgical therapy for benign prostatic obstruction, therefore used as a prognostic indicator. Present study was conducted to establish the correlation between prostatic volume on ultrasonography and clinical symptoms using the International Prostate Symptom Score in cases of prostatomegaly. **Material and Methods:** Present study was single-center, cross-sectional study, conducted in patients with age >50yrs, presenting with lower urinary tract symptom not relieved on medication, willing for DRE and underwent USG. **Results:** The majority of patients were >70 years (42%) followed by 61-70 years (41%), and 51-60 years (17%). Majority of patients had grade 3 on Digital rectal examination (43%), followed by Grade 2 (35%), and grade 1 (22%). Among patients for prostate volume, majority were grade 2 (39%) followed by grade 3 (38%), and grade 1 (23%). Among patient's majority had 50-100 ml Residual urine volume (50%) followed by >100 ml (34%) and <50 ml (16%). Among patient's majority have IPSS score of 20-35 (44%), followed by 8-19 (30%) and score of 0-7 (26%). Among patient's majority had IPSS score reduced significantly after treatment. We noted highly significant statistical (p=0.0001) correlation between prostate volume and DRE, between prostate volume and IPSS, between IPSS and DRE and between prostate volume and Age. **Conclusion:** The International prostate symptom score (IPSS) is a very useful diagnostic as well as prognostic tool in cases of prostatomegaly and is a directly related to the size of prostate gland as observed on clinical per rectal examination as well as confirmed by ultrasonography.

Keywords: The International prostate symptom score (IPSS), prostatomegaly, per rectal examination, ultrasonography, clinical symptoms.

*Address for Correspondence:

Dr Nandini Sateesh Desai, Junior Resident, Department of General Surgery, Vilasrao Deshmukh Government Medical College Latur, Maharashtra, INDIA.

Email: nansd5795@gmail.com

Received Date: 13/12/2021 Revised Date: 18/01/2022 Accepted Date: 07/02/2022

This work is licensed under a [Creative Commons Attribution-NonCommercial 4.0 International License](https://creativecommons.org/licenses/by-nc/4.0/). 

Access this article online

Quick Response Code:



Website:

www.medpulse.in

DOI:

<https://doi.org/10.26611/1062212>

INTRODUCTION

The prostate is the largest accessory sex gland of males. It is a fibromuscular glandular, exocrine gland that secretes alkaline fluid which constitutes about 20-30% volume of the seminal fluid.¹ Benign prostatic enlargement (BPE), bladder outlet obstruction (BOO) and lower urinary tract symptoms (LUTS) is the basic triad for clinical diagnosis of benign prostatic hyperplasia (BPH).² BPH is rare in men younger than 40 years but is present in up to 50% of men over 60 years of age and nearly 88% by 80 years of age.³ As such, it is often thought of essentially as a "normal" part of aging. Although a degree of

prostatomegaly may be completely asymptomatic, the most common presentation is lower urinary tract symptoms (LUTSs) including poor urinary stream despite straining, hesitancy, frequency, and incomplete emptying of the bladder and nocturia.⁴ Ultrasound of the prostate is the investigation that enables us to visualize the prostate gland directly and is one of the most common diagnostic modalities performed nowadays. The International prostate symptom score (IPSS) is widely used to assess the severity of LUTS in men with bladder outlet obstruction and to evaluate the response to medical or surgical therapy for benign prostatic obstruction, therefore used as a prognostic indicator. The IPSS is a written screening tool comprising seven symptom questions.⁹ Therefore, the present study was conducted to establish the correlation between prostatic volume on ultrasonography and clinical symptoms using the International Prostate Symptom Score in cases of prostatomegaly.

MATERIAL AND METHODS

Present study was single-center, cross-sectional study, conducted in Department of General Surgery, Vilasrao Deshmukh Government Medical College, Latur, India. Study duration was of 18 months (December 2019 to May 2021). The study was approved by the Ethical Committee of the institute.

Inclusion criteria: Patients with age >50yrs, presenting with lower urinary tract symptom not relieved on medication, willing for DRE

Exclusion criteria: All patients with retention due to strictures, urolithiasis, and carcinomas. Patients with associated comorbid conditions. Neurological conditions like Parkinson's disease, cerebrovascular accident, diabetes mellitus, overactive bladder. Urinary tract infections

Study was explained to patients and written informed consent was taken for participation. Detailed History noted according to IPSS questionnaire and clinical examination done in detail. Tools for assessment used were International prostatic symptom score and Prostatic size on USG (The size of the prostate, pre and post-void volume, the lobes involved, and residual urine volume was assessed.). Patients undergo Investigations like-Serum PSA. For medical fitness and preoperative workup –CBC, LFT, KFT, BSL, HIV, HBsAg, Blood Group, Chest X-ray PA view, X-ray abdomen standing, ECG.

Rectal examination was done to know the grades of enlarged prostate and the lobes as,

Grade I: The prostate is just palpable and the upper limit is easily reached.

Grade II: The prostate is well palpable and the upper limit is reached with difficulty.

Grade III: The upper limit of the prostate cannot be reached.

Table 1: IPSS SCORE: INTERNATIONAL-PROSTATE SYMPTOM SCORE (I-PSS)⁴

1. Over the past 4 weeks, how often have you had a sensation of not emptying your bladder after you Finished urinating?	0 -Not at all, 1- Less than 1 time, 2- Less than half the time, 3= About half the time, 4- More than half the time, 5- Almost always
2. Over the past 4 weeks, how often have you had to urinate again less than two hours after you finished urinating?	
3. Over the past 4 weeks, how often have you found you stopped and started again several times when you urinated?	
4. Over the past 4 weeks, how often have you found it difficult to postpone urination?	
5 Over the past 4 weeks, how often has your urinary stream been weaker than usual?	
6 Over the past 4 weeks, how often have you had to push or strain to begin urination?	0 – None, 1 -1 time, 2 -2 times, 3 -3 times, 4 - 4 times, 5 - 5 or more times
7. Over the past 4 weeks, how many times, in general, did you get up to urinate from the time you went to bed at night until the time you got up in the morning?	
QUALITY OF LIFE DUE TO URINARY SYMPTOMS	0 -Delighted, 1 - Pleased, 2 - Mostly satisfied, 3 - Mixed - neither satisfied nor dissatisfied, 4 - Mostly dissatisfied, 5 - Unhappy, 6 -Terrible
1. If you were to spend the rest of your life with your Urinary condition just the way it is now, how would you feel about that?	

IPSS Score	Correlation
0-7	Mildly symptomatic
8-19	Moderately symptomatic
20-35	Severely symptomatic

Data was entered using Microsoft excel and analyzed using SPSS version 22. Data were summarized in frequency tables, pie charts, and histograms. Categorical variables were reported as a proportion. Continuous data were described as means (standard deviation) or medians (interquartile range) depending on the distribution of data. The level of significance criteria was selected at $P < 0.05$.

RESULTS

The majority of patients were >70 years (42%) followed by 61-70 years (41%), and 51-60 years (17%). Among patient's majority had Hypertension (33%), diabetes (20%) and polycystic kidney disease (2%).

Table 1: General characteristics

General characteristics	No of patients	Percentage
Age group (years)		
51-60	17	17%
61-70	41	41%
>70	42	42%
Co-morbidities		
Hypertension	33	33%
Diabetes Mellitus	20	20%
Polycystic Kidney	02	2%

In present study, majority of patients had grade 3 on Digital rectal examination (43%), followed by Grade 2 (35%), and grade 1 (22%). Among patients for prostate volume, majority were grade 2 (39%) followed by grade 3 (38%), and grade 1 (23%). Among patient's majority had 50-100 ml Residual urine volume (50%) followed by >100 ml (34%) and <50 ml (16%).

Table 2: Distribution of patients according to Prostate Size on DRE

Characteristics	No of patients	Percentage
Size on DRE		
Grade 1	22	22%
Grade 2	35	35%
Grade 3	43	43%
Prostate volume		
Grade 1 (30-50)	23	23.0
Grade 2 (50-70)	39	39.0
Grade 3 (>70)	38	38.0
Residual urine volume		
<50 ml	16	16.0
50-100 ml	50	50.0
>100 ml	34	34.0

Among patient's majority have IPSS score of 20-35 (44%), followed by 8-19 (30%) and score of 0-7 (26%). Among patient's majority had IPSS score reduced significantly after treatment.

Table 3: Distribution of patients according to preoperative IPSS

IPSS score	Pre-operative (No of patients / %)	Post-operative (No of patients / %)
0-7	26 (26 %)	36 (36 %)
8-19	30 (30 %)	44 (44 %)
20-35	44 (44 %)	20 (20 %)

Among voiding symptoms majority have incomplete bladder emptying (40%) and straining (24%), prolonged micturition (14%), and poor/intermittent stream (10%) and Dribbling, Hesitancy each 6 (6%).

Table 4: Distribution of patients according to Voiding symptoms

Voiding symptoms	Frequency	Percentage
Hesitancy	6	6.0
Poor and intermittent stream	10	10.0

Straining	24	24
Prolonged micturition	14	14.0
Feeling incomplete bladder emptying	40	40.0
Dribbling	6	6

Among storage, symptoms majority had increased frequency (44%), followed by nocturia (39%), urge incontinence (9%) and urgency (8%).

Table 5: Distribution of patients according to Storage symptoms.

Storage symptoms	frequency	Percentage
Frequency	44	44
Urgency	8	8
Urge incontinence	9	9
Nocturia	39	39

The majority of patients have PSA levels 4-10 (56%), <4 PSA levels (34%), and least is >10 PSA levels (10%).

Table 6: Distribution of study participants according to PSA levels

PSA levels (ng/ml)	Frequency	Percentage
<4	34	34
4-10	56	56
>10	10	10
Total	100	100

We noted highly significant statistical (p-0.0001) correlation between prostate volume and DRE, between prostate volume and IPSS, between IPSS and DRE and between prostate volume and Age.

Table 7: Various correlations

Co-relation	Pearson Correlation coefficient	P value
Correlation between prostate volume and DRE	0.903	0.0001
Correlation between prostate volume and IPSS	0.725	0.0001
Correlation between DRE and IPSS	0.656	0.0001
Correlation between prostate volume and Age	0.202	0.0001

DISCUSSION

Clinical diagnosis of BPH is made by the assessment of IPSS, prostate size or volume and reduced urinary flow rate. Histopathologically, BPH is characterized by an increased number of epithelial and stromal cells in the periurethral transitional zones of the prostate.⁶ The fact that the development of benign prostatic enlargement (BPE), LUTS, and bladder outlet obstruction (BOO) are temporally related does not imply these events are causally related. Nevertheless, LUTS in the presence of some degree of prostatic enlargement have been sufficient to establish the clinical diagnosis of BPH.⁷ Uroflowmetry is one of the simplest and non-invasive urodynamic investigations used in the measurement of urinary flow rate using a flowmeter for the evaluation of obstructive LUTSs, information is plotted on a graph and interpreted by the treating doctor.⁸ In our study majority of patients are old age group and frequency decreased as age decreased. In a study done by Mohit G *et al.*,⁹ mean age was 62.18 ± 6.76 years and majority were from age group of 60-70 years. Similar findings were noted by Basawaraj NG *et al.*,¹⁰ as mean age of 65.06 ± 9.02 years. In a study done by Jaikant Paswan *et al.*,¹¹ majority of patients were from 60-70 years age group (34%), followed by 50-60 years (29%). Among patient's majority have

Hypertension 33 (33%), diabetes 20 (20%), and polycystic kidney disease 2 (2%). In a study done by Mcvary KT *et al.*,¹² most frequently associated Comorbidities with prostatomegaly were hypertension, cardiovascular diseases, and erectile dysfunction. The majority of patients are grade 3 on Digital rectal examination 43 (43%), Grade 2 35 (35%), and least grade 1 22 (22%). Mohit G *et al.*,⁹ noted that 41.7% belong to grade II and 40% belong to Grade 1, and the least of 18.3% among grade III. Almost all these findings of DRE were radiologically confirmed by ultrasonography. Therefore, it can be stated that DRE is a very efficient tool in the diagnosis as well as grading of BPH. Similar findings were present in our study after doing DRE they were confirmed radiologically. In our study, prostate volume is measured using ultrasonography, the majority had grade 2 (39%), grade 3 (38%), and least grade 1 (23%). Mohit G *et al.*,⁹ noted that majority of patients have grade II prostrate volume (43.3%), followed by grade I (40%) and grade III (16.7%). In a study done by Basawaraj NG *et al.*,¹⁰ majority of patients, 35.7% has prostate volume 31-50 cc, followed by 30.9% of 21-30 cc volume and (19.8%) had the volume of more than 50 cc. Awaisu M *et al.*,¹³ noted that, median prostate volume was 45.05 cm³ with IQR (35 cm³ – 59 cm³), and the mean

prostate volume was $52.58 \text{ cm}^3 \pm 30.53 \text{ cm}^3$ (range $24.60 \text{ cm}^3 - 319.00 \text{ cm}^3$). Basawaraj NG *et al.*,¹⁰ noted that maximum number of patients had severe symptom scores (41.3%), followed by moderate symptom scores (37.3%) and mild symptom score (21.4%). In a study done by Eriawan Agung Nugroho *et al.*,¹⁴ majority, 63.4% belong to severe grade which is the score of 20-35, moderate grade 36.6% which is a score of 8-19, and no mild grade. Similarly, in a study done by Gnyawali D *et al.*,¹⁵ 74.5% of patients belonged to a score of 20-35 and followed by 25.5% of patients belonging to score of 8-19 and no cases of a mild score. In a study done by Mudi Awaisu *et al.*,¹³ majority of 55% of patients had moderate score and followed 33% of patients with severe score and 12% with a mild score. The findings in our study are consistent with above studies.^{10,13,14,15} In our study majority of patients have symptoms of incomplete bladder emptying (40%) followed by straining (24%), prolonged micturition (14%), and the least frequent are dribbling and hesitancy (6% each). Basawaraj NG *et al.*,¹⁰ the commonest clinical presentation was incomplete emptying and straining (50%). While, CS Agrawal *et al.*,¹⁶ common voiding symptoms were incomplete bladder emptying and followed by straining, prolonged micturition, poor stream, and least frequent are dribbling and hesitancy. The findings in our study are consistent with study findings of previously mentioned studies. Among storage symptoms majority is increased frequency 44 (44%), followed by nocturia 39 (39%), urge incontinence 9 (9%), and urgency 8 (8%). Basawaraj NG *et al.*,¹⁰ noted that nocturia (93.6%) followed by increased frequency of micturition (83.3%) and urgency (76.9%) were common symptoms. In present study, highly statistically significant ($p=0.0001$) correlation between prostate volume and DRE, between prostate volume and IPSS, between IPSS and DRE and between prostate volume and Age. Mohit Goyal *et al.*,⁹ noted a statistically significant correlation between Prostrate volume and DRE. Almost all findings of Digital rectal examination were radiologically confirmed by ultrasonography. Therefore, it can be stated that DRE is a very efficient tool in the diagnosis as well as grading of prostate size. Similar findings noted in present study. In our study, there is a statistically significant correlation between prostate volume and age, but in a study done by Mohit Goyal *et al.*,⁹ there is no statistically significant correlation between prostate volume and Age. In our study, there is a statistically significant correlation between Prostrate volume on ultrasound and IPSS. Awaisu M *et al.*,¹⁴ noted that correlation of prostate volume with the International Prostate Symptoms Score (IPSS) was significant in their study ($p=0.002$). similarly, findings are found in a study done by Mohit goyal *et al.*⁵⁴ the statistical analysis of

prostate volume against IPSS showed a strongly significant correlation between the two parameters as the P value was <0.001 . The findings in our study are consistent with study findings of previously mentioned studies. Prostatomegaly affects almost all males with age and is one of the most common cause of elderly males visiting hospital with lower urinary tract symptoms. In peripheral centers where these modalities of radiological diagnosis are unavailable, this IPSS system along with the digital rectal examination can be a very reliable guide for the treatment of prostatomegaly. Patients keeping a record of their symptoms in voiding diary before and after treatment can be followed up regularly to check the efficacy of the ongoing treatment and any modifications required can thus be made.

CONCLUSION

The International prostate symptom score (IPSS) is a very useful diagnostic as well as prognostic tool in cases of prostatomegaly and is a directly related to the size of prostate gland as observed on clinical per rectal examination as well as confirmed by ultrasonography. IPSS is easy, reliable and cost-effective way in the management of prostatomegaly. Clinical symptoms can be a significant indicator of severity of the disease and thus can guide in the management of the same.

REFERENCES

1. Berry SJ, Coffey OS, Walsh PC, Ewing LI. The development of human benign prostatic hyperplasia with age. *J Urol* 1984;132:474-9.
2. Roehrborn CG, McConnell JD, Saltzman B, Bergner D, Gray T, Narayan P, Cook TJ, Johnson-Levonas AO, Quezada WA, Waldstreicher J, PLESS Study Group. Storage (irritative) and voiding (obstructive) symptoms as predictors of benign prostatic hyperplasia progression and related outcomes. *European urology*. 2002 Jul 1;42(1):1-6.
3. Girman CJ. Population-based studies of the epidemiology of benign prostatic hyperplasia. *Br J Urol*. 1998;82(suppl 1):34-43.
4. Girman CJ, Jacobsen SJ, Rhodes T, et al. Association of health-related quality of life and benign prostatic enlargement. *Eur Urol*. 1999; 35:277-284.
5. Lee KC, Weiss JP. Nocturia: Etiology, Pathology, Risk Factors, Treatment, and Emerging Therapies. Academic Press; 2019 Sep 9.
6. Girman CJ, Jacobsen SJ, Tsukamoto T, et al. Health-related quality of life associated with lower urinary tract symptoms in four countries. *Urology*. 1998; 51:428-436.
7. Abrams P. In support of pressure-flow studies for evaluating men with lower urinary symptoms. *Urology*. 1994; 44:153-155.
8. Oelke M, Hofner K, Jonas U, de la Rosette JJ, Ubbink DT, Wijkstra H. Diagnostic accuracy of noninvasive tests to evaluate bladder outlet obstruction in men: detrusor wall thickness, uroflowmetry, postvoid residual urine, and prostate volume. *Eur Urol*. 2007;52:827-34.

9. Mohit G, Dhananjay D, Puneet T, Sanjay kumar G. To Know the Correlation of Prostate Size on Ultrasound with International Prostate Symptom Score and Uroflowmetry in Benign Prostatic Hyperplasia. *International Journal of Scientific Study*. 2020; 8(3): 52-58.
10. Basawaraj NG, Arul Dasan T, Savitha S. Correlation of sonographic prostate volume with international prostate symptom score in South Indian men. *International Journal of Research in Medical Sciences*.2015;3(11):3126-3130.
11. Jaikant Paswan, Bijendra kumar. Comparative evaluation of relationship between prostate volume and lower urinary tract symptoms. *International Journal of Health and Clinical Research*, 2021;4(5):59-61.
12. McVary KT. BPH: epidemiology and comorbidities. *Am J Manag Care*. 2006 Apr;12(5):122-128.
13. Awaisu, M., Ahmed, M., Lawal, A.T., Sudi, A., Tolani, M.A., Oyelowo, N., Muhammad, M.S., Bello, A. and Maitama, H.Y., 2021. Correlation of prostate volume with the severity of lower urinary tract symptoms as measured by international prostate symptoms score and maximum urine flow rate among patients with benign prostatic hyperplasia. *African Journal of Urology*, 27(1), pp.1-7.
14. Eriawan Agung Nugroho, Abu Azhar, Ezra Endria. Relationship between Prostate Volume and International Prostate Symptom Score (IPSS) Degree of Tamed Prostate Enlargement on Transabdominal Ultrasonography (TAUS) and Transrectal Ultrasonography (TRUS) Examination. *Biomedical Journal of Indonesia*.2021;7(1): 112-117.
15. Gnyawali D, Sharma U. Correlation of prostate volume with 'International Prostate Symptom Score' and 'Benign Prostatic Hyperplasia-Impact Index' in benign prostatic hyperplasia. *Journal of Society of Surgeons of Nepal*. 2014;17(1):6-10.
16. 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 Med Coll J*. 2008 Jun 1;10(2):104-7.

Source of Support: None Declared
Conflict of Interest: None Declared

