Research Article

The Relationship Between Prostate Volume and IPSS Score in BPH Patient at the Siti Khodijah Muhammadiyah Cabang Sepanjang Hospital

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Abstract

Benign Prostatic Hyperplasia (BPH) is the growth of non-malignant cells or hyperplasia of prostate tissue which causes LUTS in men. One system to assess the symptoms of obstruction due to prostate enlargement is the International Prostate Symptom Score (IPSS). Prostate volume is performed to check the progress of BOO (Bladder Outlet Obstruction) using Transabdominal Ultrasound. This research is an analytical observational study with a prospective cohort method. The sample selection in this research applied consecutive sampling techniques using predetermined inclusion and exclusion criteria. The number of samples used was 30 patients in the period between November 2022 and April 2023. The results showed that the prostate volume in grade II was 46.7%, while for grade I was 33.3% and grade III was 20%. For the results of the IPSS, the moderate category was 76.7%, with mild and severe IPSS scores are 10% and 13.3%. The Spearman test results showed that the p-value was 0.006 <0.05, the value of r = 0.486, and the correlation coefficient was positive, which means that there is a fairly strong relationship between prostate volume and IPSS score in BPH patients at the Siti Khodijah Muhammadiyah Cabang Sepanjang Hospital.

Keywords **:** BPH, prostate volume, IPSS
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INTRODUCTION

The prostate gland is a genital organ that is only found in men, located behind the bladder and surrounding the posterior urethra. As age increases, there is a possibility of changes in the prostate, where the prostate gland will enlarge. If enlargement occurs, it can block the prostatic urethra which results in disruption of the urine excretion process. As a result, the bladder must work stronger than normally, which could cause micturition problems (Purnomo, 2016).

Benign Prostatic Hyperplasia (BPH) is the growth of non-malignant cells or hyperplasia of prostate tissue which causes LUTS complaints in men (Ng and Baradhi, 2021). Prostate growth is strongly influenced by the hormone testosterone. Until now, the exact cause of prostatic hyperplasia is still not known. However, there are several hypotheses which argue that prostatic hyperplasia is related to increased levels of dihydrotestosterone (DHT) in men and the aging process. In particular, 50% to 60% in men aged 60 years are at risk of suffering from prostatic hyperplasia. The risk will increase to between 80% and 90% in men aged over 70 years (Amadea et al., 2019).

BPH patients often complain of LUTS in the form of urinary tract symptoms which only occur when this disorder affects the bladder in men, which consists of storage symptoms and voiding symptoms (Bimandama and Kurniawaty, 2018). Over a long period, if left untreated, it can cause chronic high-pressure retention (emergency to life-threatening) and long-term changes in the bladder detrusor (excessive activity) and decreased contractility (Ng and Baradhi, 2021).

Based on the 2018 Riskesdas, BPH is the second disease experienced by 50% of men in Indonesia aged around 50 years (Komang and Widiasih 2021). Moreoever, according to data from WHO in 2016, there were almost 30 million cases of BPH, with the highest incident in developed countries of 19% while 5.35% in developing countries (Amadea et al., 2019).

One system to assess the presence of symptoms of obstruction due to an enlarged prostate is the International Prostate Symptom Score (IPSS). This scoring system evaluates patient symptoms subjectively to determine whether they are severe, mild or moderate. Prostate volume examination using ultrasound is an important examination to assess the progress of BOO (Bladder Outlet Obstruction). An increase in the volume of the prostate in BPH patients causes narrowing of the lumen of the prostatic urethra which causes the obstruction of the urine flow (Utami et al., 2018).

However, according to Hossain et al, the severity of symptoms and obstruction does not depend on the enlargement of the prostate volume (Hossain et al. 2012). The correlation between prostate volume and LUTS shows that low prostate volume does not always have a relationship with symptoms (Ng and Baradhi, 2021). Based on the explanation of IPSS and prostate volume, the relationship between these two approaches is still

controversial until now, with several other studies suggesting that prostate volume and obstruction have a weak correlation with high scores on the IPSS (Ofoha et al., 2015).

METHODS

This research is an analytical observational study with a prospective cohort design in order to help the researchers obtain information regarding the studied subject when the patient is suffering from the symptomps at the same time (i.e. observations of the independent and dependent variables are carried out simultaneously), hence the accuracy of the data obtained is more valid.

In this study, the sampling technique used was consecutive sampling, in which all patients who met the inclusion and exclusion criteria were used as samples in the study. Inclusion criteria in this study were patients diagnosed with BPH by a urology specialist with complaints of LUTS, BPH patients who underwent an ultrasound examination and BPH patients who were willing to become research samples. Meanwhile, exclusion criteria were BPH patients who did not have an ultrasound examination, BPH patients who were not willing to be sampled in the study, BPH patients with symptoms of dysuria and hematuria, BPH patients with urinary retention, BPH patients who had complications, BPH patients who had undergone prostate surgery, BPH patients with bladder stones/urethral stones, and BPH patients who have other comorbidities such as urinary tract infections and bladder tumours.

The data analysis used for this research is univariate and bivariate which will be analysed using the SPSS application. Univariate analysis was used to observe the frequency distribution. Bivariate analysis is used to determine the relationship between the two variables to be studied. The data scale used is the categorical Spearman test (Irmawartini and Nurhaedah 2017).

RESULTS

Table 1. Demographics of the sample age group

Age group (years)	N	%
<50	3	10
50-59	7	23,3
60-69	14	46,6
> 70	6	20
Total	30	100

The number of samples used was 30 patients between November 2022 and April 2023 who met the inclusion and exclusion criteria in this study. Based on Table 1, the majority of BPH patients at the Siti Khodijah Muhammadiyah Cabang Sepanjang

Hospital are 14 people (46.6%) between the ages of 60-69, 7 people (23.3%) between the ages of 50-59, 6 people (20%) more than the age of 70, and 3 people (10%) under the age of 50. The youngest patient with BPH is the age of 38 and the oldest is the age of 80.

Table 2. Distribution of respondents based on prostate volume

Volume Prostat	Frekuensi	Persentase (%)
Grade I	10	33,3
Grade II	14	46,7
Grade III	6	20
Total	30	100
Mean = 41,84 cc		
Minimum = 25 cc		
Maksimum = 85 cc		

Based on Table 2, the majority (46.7%) of BPH patients at the Siti Khodijah Muhammadiyah Cabang Sepanjang Hospital have prostate volume in Grade II, while for BPH patients in Grade I and grade III are 33.3% and 20%, respectively. The average prostate volume for BPH patients at the Siti Khodijah Muhammadiyah Cabang Sepanjang Hospital was 41.84 cc (range 25-85 cc).

Table 3. Distribution of respondents based on IPSS

IPSS	Frequency	Percentage %
Light	3	10
Moderate	23	76,7
Severe	4	13,3
Total	30	100
Mean = 13,47		
Minimum = 4		
Maximum = 26		

Based on Table 3, the majority (76.7%) of BPH patients at the Siti Khodijah Muhammadiyah Cabang Sepanjang Hospital have IPSS scores in the moderate category; that is, BPH patients with mild and severe IPSS scores of 10% and 13.3%, respectively. The average IPSS score for BPH patients at the Siti Khodijah Muhammadiyah Cabang Sepanjang Hospital was 13.47 (range 4-26).

Table 4. Relationship between prostate volume and IPSS score in BPH patients at the Siti Khodijah Muhammadiyah Cabang Sepanjang Hospital

Prostate Volume	IPSS			Total	
	Light	Moderate	Severe		
Grade I	2 (6,7%)	8 (26,7%)	0 (0,0%)	10 (33,3%)	
Grade II	1 (3,3%)	12 (40,0%)	1 (3,3%)	14 (46,7%)	*p-value* = 0,006
Grade III	0 (0,0%)	3 (10,0%)	3 (10,0%)	6 (20,0%)	r = 0,486
Total	3 (10,0%)	23 (76,7%)	4 (13,3%)	30 (100%)	

The results of the Spearman test in Table 4 show that the p-value is 0.006 < 0.05, which means that H0 is rejected. Therefore, there is a relationship between prostate volume and IPSS score in BPH patients at the Siti Khodijah Muhammadiyah Cabang Sepanjang Hospital. The correlation coefficient value is 0.486. This value is in the interval 0.4-0.599, which is considered as having a relatively strong category. Therefore, that there is a fairly strong relationship between prostate volume and IPSS score in BPH patients at the Siti Khodijah Muhammadiyah Cabang Sepanjang Hospital. The correlation coefficient is positive, which means that there is a relationship between prostate volume and IPSS score in BPH patients at the Siti Khodijah Muhammadiyah Cabang Sepanjang Hospital.

DISCUSSION

The 30 samples obtained included the youngest age of 38 and the oldest age of 80, with an average age of 63. For the youngest sample (38), it is not yet clear why BPH was diagnosed at a very young age compared to the average age of the sample. This may be caused by an unhealthy lifestyle – such as poor dietary and exercise habit. Some patients complain the initial symptoms that appear are pain at the back of the waist due to an enlarged prostate that is pressing on the urethra and urinary bladder (Lokeshwar1

et al., 2019). Accompanied by the most frequent complaints of LUTS which are in accordance with the IPSS questionnaire are urinary symptoms of nocturia (patients complain that they often wake up to urinate at night), and incomplete emptying (the patient complains of incomplete urination).

The research results found that the majority (46.7%) of BPH patients at the Siti Khodijah Muhammadiyah Cabang Sepanjang Hospital had a prostate volume in Grade II, while for BPH patients in Grade I and Grade III are 33.3% and 20%, respectively. The average value of prostate volume for BPH patients at the Siti Khodijah Muhammadiyah Cabang Sepanjang Hospital was 41.84 cc (range 25-85 cc) falling into the Grade II category (30-60 cc). The results of this research are in line with the research of Fauziya et al, in which the majority of BPH patients in hospitals have prostate volumes between 41-70 cc (Fauziya et al. 2021).

These findings are also in line with research conducted by Komang and Widiasih, in which the majority of BPH patients had a moderate IPSS score of 59.6% (Komang and Widiasih 2021). Research by Wiarini in 2019, the results of measuring the severity of LUTS in as many as 42 BPH patients (55.3%), showed that the majority of LUTS were moderate (Komang and Widiasih 2021).

The results of this study show that there is a relationship between prostate volume and IPSS score in BPH patients at the Siti Khodijah Muhammadiyah Cabang Sepanjang Hospital, as evidenced by the p-value of $0.006 < 0.05$. Among the BPH patients at the Siti Khodijah Muhammadiyah Cabang Sepanjang Hospital who had Grade I prostate volumes, most patients had moderate IPSS scores. Among patients with Grade II prostate volumes, most patients had moderate IPSS scores. Among patients with Grade III prostate volumes, most patients had moderate and severe IPSS scores. The correlation coefficient value is 0.486. This value is in the interval 0.4-0.599, within the quite strong category, which means that there is a fairly strong relationship between prostate volume and the IPSS score in BPH patients at the Siti Khodijah Muhammadiyah Cabang Sepanjang Hospital. The correlation coefficient is positive, meaning that there is an unidirectional relationship between prostate volume and IPSS score in BPH patients at the Siti Khodijah Muhammadiyah Cabang Sepanjang Hospital.

The results of this study are also in line with research by Imtiyaz in 2016 in India which stated that there was a strong correlation between prostate volume and the total IPSS score ($p<0.001$) (Imtiyaz Ahmed 2016). Moreover, according to Mailani, Ilma et al. in 2018, they found that there was a correlation between the degree of IPSS and prostate volume (Mailani et al., 2018). Virliana in 2017 also stated that prostate volume had a significant relationship with LUTS, indicating that the larger the prostate volume, the more severe the patient's clinical symptoms (Virliana 2017). A theoretical explanation, according to Maghfira in 2023, is that the increase in IPSS in BPH patients is the result of an increase in prostate volume. An increase in prostate volume causes narrowing of the lumen of the prostatic urethra, thereby inhibiting urine flow, which will cause an

increase in intravesical pressure. Consequently, the bladder will contract continuously to resist the obstruction. Contractions that occur continuously will cause changes in the anatomy of the bladder to become detrusor hypertrophy, the formation of saccules, cells, as well as bladder diverticula. Changes that occur in the structure of the bladder are felt in the lower urinary tract or lower urinary tract symptoms (LUTS) (Maghfira 2023).

However, there are several other studies with different results. For instance, a research by Udeh et al. in 2012, who also examined the relationship between prostate volume and IPSS in African men suffering from BPH, found that there was no strong relationship between these two variables. Udeh's study also quoted research by Kaplan et al and Yang et al which examined the relationship between prostate volume and IPSS. These two studies obtained similar results: that is, there was no strong relationship between the two variables (Udeh, Ozoemena, and Ogwuche 2012).

In addition, a research by Utami in 2018, which examined the correlation between prostate volume and total IPSS in BPH patients, showed statistical results that there was no significant relationship between prostate volume and IPSS (Utami et al., 2018).

The differences in research results which prove the existence of relationship between prostate volume and IPSS both in Indonesia and abroad are likely influenced by several factors. First, differences in the methods applied; that is, using cross-sectional methods of medical record data or prospective cohorts. Second, the number and extent of sampling in each study can affect the validity of the research results. Third, geographical and racial factors in research conducted abroad could make the sample to have a higher risk of developing BPH than the Indonesian patients. Last, differences in the characteristics of each individual in responding to symptoms of BPH may influence the results of the IPSS.

The advantage of this study is it uses a prospective cohort method where researchers fill out the IPSS questionnaire by interviewing the patient directly after the patient completed an abdominal ultrasound to evaluate the size of the prostate volume. In this way, the researchers could obtain questionnaire data which are more relevant and accurate alongside the symptoms experienced by BPH patients after an abdominal ultrasound is performed, compared to using the retrospective cohort method. Furthermore, another advantage of this study is the researchers can also identify the initial symptoms, main complaints, and comorbidities in BPH patients that arise, when the researchers interview patients directly. This approach helps the researchers to determine whether the patient meets the predetermined inclusion and exclusion criteria. Nevertheless, the data obtained may not be valid as it is possible that the patient's symptoms may have reduced or the patient may have forgotten the complaint of LUTS.

CONCLUSION

Based on the research and discussion results, we found that there is a relationship between prostate volume and IPSS score in BPH patients at the Siti Khodijah Muhammadiyah Cabang Sepanjang Hospital.

REFERENCES

Amadea, Riselena Alysaa, Alfreth, dan Wahyuni, Rosa Dwi. 2019. "Jurnal Medical Profession Benign Prostatic Hyperplasia (BPH)." *Encyclopedia of Reproduction* 1(2):172–76.

Bimandama, M. A., and E. Kurniawaty. 2018. "Benign Prostatic Hyperplasia Dengan Retensi Urin Dan Vesicolithiasis Benign Prostatic Hyperplasia with Urine Retention and Vesicolithiasis." *Jurnal Agromedicine Unila* 5(2):655–61.

Fauziya, Zahra, Hendra Sutapa, Dewi Indah, and Noviana Pratiwi. 2021. "Literature Review: Pengaruh Volume Prostat Terhadap Kejadian Retensi Urin Akut Pada Pasien Bph." *Homeostatis* 4(1):93–102.

Harlan, Johan, and Rita Sutjiati. 2018. Metodologi Penelitian Kesehatan. Jakarta: Gunadarwan

Hossain, A. K. M. S., A. K. M. K. Alam, A. K. M. K. Habib, M. M. Rashid, H. Rahman, A. K. M. A. Islam, and M. U. Jahan. 2012. "Comparison between Prostate Volume and Intravesical Prostatic Protrusion in Detecting Bladder Outlet Obstruction Due to Benign Prostatic Hyperplasia." *Bangladesh Medical Research Council Bulletin* 38(1):14–17. doi: 10.3329/bmrcb.v38i1.10446.

Imtiyaz Ahmed, Iqbal Aziz. 2016. "Correlation between Prostate Volume and Lower Urinary Tract Symptoms (LUTS) as Measured by International Prostate Symptom Score (IPSS)." *International Journal of Scientific and Research Publications* 6(4):45.

Irmawartini, and Nurhaedah. 2017. Metodologi Penelitian. Kementrian Kesehatan Republik Indonesia.

Komang, Dewa Ayu, and Alit Widiasih. 2021. "Skripsi Hubungan Lower Urinary Tract Symptoms (Luts) Terhadap Kualitas Hidup Pasien Bph Di Klinik Urologi Rsd Mangusada Badung Program Studi S1 Keperawatan Sekolah Tinggi Ilmu Kesehatan Bina Usada Bali 2021."

Lokeshwar1, Soum D., Andre Jordan1 , Benjamin T. Harper2, Eric Webb2, Durwood E. Neal Jr2 , Thomas A. Dykes3, 3 , Martha K. Terris2, and Zachary Klaassen2. 2019. "Epidemiology and Treatment Modalities for the Management of Benign Prostatic Hyperplasia." doi: 10.21037/tau.2019.10.01.

Maghfira, Jihan. 2023. "Hubungan Volume Prostat Dengan Skor Ipss Pada Penderita

Benign Prostatic Hyperplasia (Bph) Di Rsu Haji Medan Skripsi."

Mailani, Ilma, Nur, Priatna, and Andri Kusumah, Anugrah. 2018. "Kesesuaian International Prostate Symptoms Score Dengan Volume Prostat Berdasarkan Usg Transabdominal Di Rs Dustira." 000:1–9.

Ng, Michael, and Krishna M. Baradhi. 2021. *Benign Prostate Hyperplasia*.

Ofoha, C. G., S. I. Shu, I. C. Akpayak, N. K. Dakum, and V. M. Ramyil. 2015. "Relationship between Prostate Volume and IPSS in African Men with Prostate Disease." *Jos Journal of Medicine* 9(1):16–19.

Purnomo, Basuki B. 2016. *Dasar-Dasar Urologi*. III. Malang, Jawa Timur: Sagung Seto.

Udeh, E. I., O. F. Ozoemena, and E. Ogwuche. 2012. "The Relationship between Prostate Volume and International Prostate Symptom Score in Africans with Benign Prostatic Hyperplasia." *Nigerian Journal of Medicine : Journal of the National Association of Resident Doctors of Nigeria* 21(3):290–95.

Utami, Rahma Illa Putri, Septa Surya Wahyudi, and Yuli Hermansyah. 2018. "Hubungan Prostate Volume Dan Intravesical Prostatic Protrusion Terhadap International Prostate Symptom Score Pada Pasien Benign Prostate Hyperplasia (Relationship between Prostate Volume and Intravesical Prostatic Protrusion and International Prostate." *Pustaka Kesehatan* 6(1):97. doi: 10.19184/pk.v6i1.6792.

Virliana, Rini. 2017. "Hubungan Antara Volume Prostat Dengan Lower Urinato Tract Symptoms (Luts) Pada Penderita Pembesaran Prostat Jinak Di Rs Pendidikan Unhas Makassar Pada Bulan Oktober Tahun 2017."