

# Correlation between prostate volume and Lower Urinary Tract Symptoms (LUTS) as measured by International Prostate Symptom Score (IPSS)

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**Abstract-** Lower Urinary tract symptom (LUTS) is a common presentation among elderly patients particularly in men in urology clinical practice. Evaluation and treatment of LUTS is a major consideration and IPSS score and ultrasound KUBP are routine investigations for assessment of such patients. There is a controversy on relationship between IPSS score and the prostate volume in the literature. The objective is to evaluate the relationship between IPSS and prostate volume in patients with LUTS. There is a significant relationship between IPSS and prostate volume measured through abdominal ultrasound. The Total IPSS increases with the prostate volume ( $r=0.223$ ,  $p<0.003$ ). But there was no statistically significant difference between mild, moderate and severe IPSS in relation to prostate volume.

**Index Terms-** lower Urinary tract symptom (LUTS), International Prostate Symptom Score (IPSS), ultrasound KUBP, prostate volume

## I. INTRODUCTION

Lower urinary tract symptom (LUTS) is a common presentation among elderly patients especially encountered in men in urology practice. Numerous population based studies have demonstrated that bothersome LUTS affect 18–26% of men aged 40–79 years.<sup>(1)</sup> LUTS has many possible causes including supravescical causes such as spinal cord diseases and other neurological dysfunctions. Vesical and intravesical causes such as smooth muscle dysfunction of the bladder and tumors and infravesical causes like urethral strictures. Although BPH is one common cause of these symptoms, some men with LUTS have no prostate enlargement.<sup>(2)</sup>

Clinical diagnosis of benign prostatic hyperplasia is made by the assessment of urinary symptoms, prostate size or prostate volume and urinary flow rate evaluation. Treatments of LUTS aim to relieve bothersome symptoms, reduce complications and to increase the quality of life. Therefore the relief of symptoms and improvement in quality of life are the most frequent indications for intervention.<sup>(3)</sup>

LUTS is clinically assessed by international prostate symptom score (IPSS). The ultrasound KUB is a routine investigation for assessment of patients with LUTS. Ultrasound KUB refers to a diagnostic medical imaging technique of the abdomen and stands for kidneys, ureters and bladder.

Although in fact the ureters will be visible only if they are abnormally distended.

Although the commonest cause for LUTS among men is benign prostatic enlargement. Several studies have shown that not all the male LUTS are associated with prostate pathology as the bladder also plays a part in the development of LUTS.<sup>(4)</sup> Prostatic enlargement and bladder outlet obstruction are involved in altering the histological process.<sup>(5)</sup> The mechanisms linking to these histological processes of development of BPH in the prostate and lower urinary tract symptoms remain uncertain. Therefore the treatment is based on the presumed etiology of the symptoms (due to lower urinary tract obstruction, overactive bladder or a combination of both).

Ultrasound of the prostate is the investigation that enables us to visualize the prostate gland directly and is one of the commonest diagnostic modalities performed in patients presenting with LUTS. It can be done using the trans-abdominal approach as well as trans rectal approach. If the measurements of prostate volume correlate poorly with the severity of lower urinary tract symptoms, one should assess the severity of symptoms rather than the increase in prostate volume during the management. IPSS is an interview based (or self administered) clinical parameter.<sup>(6)</sup> Prostate volume is measured using ultrasound KUB which is easy, safe, noninvasive, cost-effective, repeatable, less time-consuming and demands little co-operation from the patient. There is a controversy on the relationship between IPSS score and the prostate volume in the literature. The objective of the study was to evaluate the relationship between IPSS and prostate volume in the patients with LUTS.

## II. MATERIALS AND METHODS

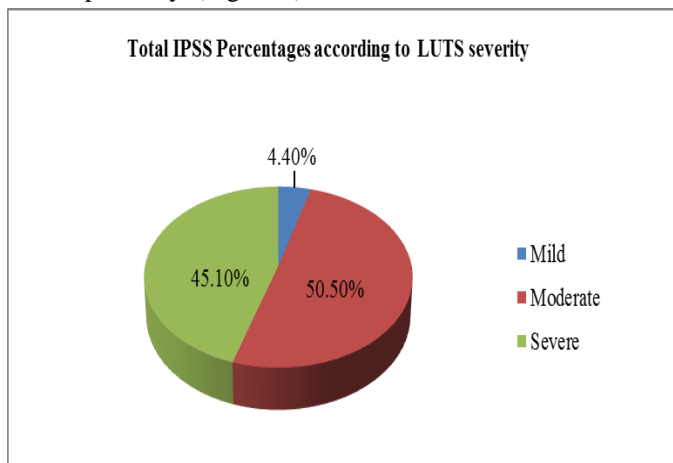
The study was conducted as a descriptive cross sectional study by the Department of Surgery, Faculty of Medicine, University of Peradeniya from June 2014 to May 2015. The study population consisted of patients who were referred to the urology clinic of the teaching hospital Peradeniya. A total of 185 patients were included in this analysis and all the patients were well informed about the study. Informed written consent was taken from patients who were willing to participate in this study. While these patients were clinically evaluated, the standardized questionnaires for IPSS<sup>(7)</sup> of the patient were also obtained by trained doctors. The prostate volume of each patient was then estimated by ultrasound KUB.

The IPSS is a numerical symptom scoring system that grades the severity of seven symptoms based on how frequently each symptom afflicts the sufferer. The scale for each symptom ranges from zero (symptom never present) to five (symptom always present). The seven symptoms are incomplete emptying, frequency, intermittency, urgency, weak stream, hesitancy and nocturia. Patient's demographic details, IPSS and prostate volume data were entered and evaluated using the statistical package for social sciences (SPSS) with one way ANOVAs and Spearman's rank correlation tests.

One way ANOVA test was used to detect any statistically significant difference between the IPSS severity groups and Spearman's rank correlation coefficient was used to detect any correlation between prostate volume and Total IPSS score.

### III. RESULTS

There were 185 patients in the study population with a mean age of 65.2 (SD=11.46) years. The mean total IPSS was 18.81(SD=7.3) and the mean prostate volume was 41.6cm<sup>3</sup>(SD=24.2) out of them 4.4% had mild, 50.5% had moderate and 45.1% had severe LUTS according to IPSS total score respectively. (Figure 1)

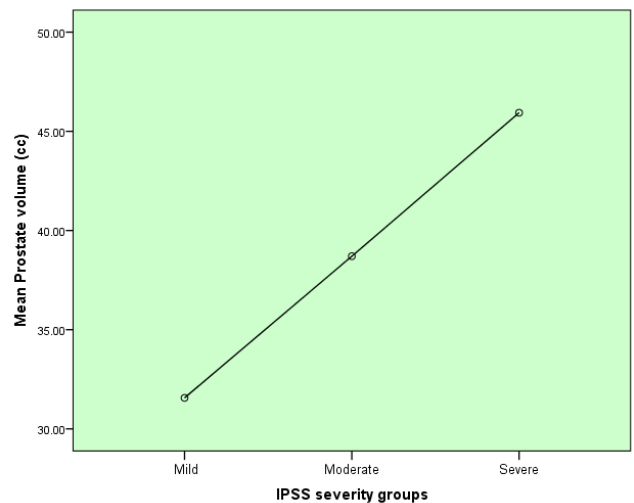


We found that the mean prostate volume measured by this method was 42.5cm<sup>3</sup> which was comparable to other study done by Vesely et al<sup>(8)</sup> (40.1 cm<sup>3</sup>) and Dicuio et al<sup>(9)</sup> (41 cm<sup>3</sup>). The mean prostate volumes were 31.56 cm<sup>3</sup> in mild, 38.70 cm<sup>3</sup> in moderate, and 45.93 cm<sup>3</sup> in severe. (Graph 1).

There was an increment in mean prostate sizes with the severity of the IPSS (Table 01), however there was no statistically significant difference among the mean prostate volumes in each IPSS severity groups as determined by one-way ANOVA (P =.071). A Spearman's rank-order correlation was applied to determine the relationship between prostate volume and total IPSS score. There was a strong positive correlation between two parameters, which was statistically significant.(Correlation Coefficient=0.223, < 0.003)

**Table (01) - Variables and values of each IPSS severity groups**

IPSS Severity	Variable	Value
Mild	Mean	31.56 cm <sup>3</sup>
	Minimum	10 cm <sup>3</sup>
	Maximum	55 cm <sup>3</sup>
Moderate	Mean	38.7 cm <sup>3</sup>
	Minimum	10 cm <sup>3</sup>
	Maximum	116 cm <sup>3</sup>
Severe	Mean	45.93 cm <sup>3</sup>
	Minimum	10 cm <sup>3</sup>
	Maximum	140 cm <sup>3</sup>



**Graph (01) - Mean prostrate volumes in each IPSS severity groups.**

### IV. DISCUSSION

BPH is a common histological condition among older men, which is intimately related to aging. Several different instruments have been developed to quantitate the severity of BPH symptoms in which IPSS is the one that is widely used.<sup>(10)</sup> In this study 185 men with LUTS were assessed and among them the vast majority of LUTS patients were elderly males and most of them presented with moderate to severe LUTS. (According to IPSS, score <7 include into mild LUTS, score of 7-20 into moderate and >20 score include into severe LUTS). This study had shown that there is a significant relationship between international prostate symptom score and prostate volume measured through trans-abdominal ultrasound KUBP. This result was similar to the study conducted in Japan T. Tsukamoto et al.<sup>(11)</sup>

However there is a controversy on the relationship between the ultrasonic prostate volume and IPSS. One study has shown that there is no significant relationship between international

prostate symptom score and prostate volume in Africans.<sup>(12)</sup> and Some studies have shown that prostate volume does not correlate with IPSS where described by Ezz et al.<sup>(13)</sup> with no correlation detected. Therefore using prostate volume as a major parameter for assessing LUTS should be further investigated.

According to this research, prostate volume increases with total IPSS. Despite the above results there was no statistically significant difference among the mean prostate volumes in mild, moderate and severe IPSS groups. Because 80% of prostate size volumes ranged between 10-60 cm<sup>3</sup> Therefore prostatic size should not be an only and important consideration; moreover, we should assess the impact of symptoms while treating the patients. As the correlation between the prostate volume and IPSS is nil, the size of the prostate should not be an important consideration to determine the need for therapy.

## V. CONCLUSION

There is a significant positive relationship between IPSS total score and prostate volume. However there was no significant difference among mean prostate volumes in each IPSS severity groups. Therefore when considering both literature and current study, ultrasound prostate volume measuring is a useful investigation. But it should not be used as the sole investigation to assess the severity of LUTS.

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