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Original Article

Correlation of Benign Prostatic Hyperplasia Diagnosed on Transabdominal Ultrasound with Urinary Retention Checked with Post Micturition Residual Volume on Ultrasound

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ABSTRACT

Benign prostatic hyperplasia (BPH), also known as benign prostatic hypertrophy, is a histologic disease in the proliferation of the cellular elements of the prostate occurs, leading to an enlarged prostate gland. Chronic BOO due to BPH may cause urinary retention, impaired kidneys, repetitive urinary tract infections, high degree hematuria, and bladder stones. **Objective:** To study the interconnection of prostatic volumes with post-micturating residual urine volume (PMR) in males with benign prostatic hyperplasia (BPH). **Methods:** It was a cross-sectional research comprising of 220 subjects who underwent an Ultrasonography scan over duration of 4 months. This study was performed in Sanabil Health Services Hospital Lahore, from 15th June, 2021 to 16th October, 2021. Men of all ages diagnosed for BPH were a part of this research. The subjects with prostatic malignancies, who underwent mild urinary tract and/or prostate surgeries and men with UTI or bladder calculi, were included in this experiment. Abdominal ultrasonography was conducted using a curved array probe of 3.5-5 MHz frequency. The outcomes were Prostate volumes and post PMR volumes. **Results:** In total, 220 subjects were evaluated. Out of these, benign prostatic hyperplasia was not found in 60(27.3%) and was present in 160(72.7%). Normal PMRV was found in 75(34.1%) and was raised in 145(65.9%). A remarkable mean difference of pre-void volume was observed in patients with BPH and without BPH. The p-value was 0.000<0.05. A significant mean difference of post-void volume was observed in patients with BPH as p-value is 0.000<0.05. **Conclusions:** Ultrasound has been proven to diagnose early prostatic enlargement and other prostate-related pathologies, our study found out that there is a remarkable connection between PMR Volume and BPH i.e., with increasing prostatic weight, urinary retention increases.

INTRODUCTION

Benign prostatic hyperplasia (BPH) is the benign overgrowth of prostate gland most commonly observed in middle-aged and elderly males [1]. It is a common urologic disease and may lead to morbidity, reduced quality of life, and may rarely result in death worldwide [2]. Generally, BPH is found in almost 50% of men of ages 50 years and more [3,4]. Many factors contribute to this disease. These factors include smoking; increased physical activity and congestive heart failure [5]. Although not life-threatening, BPH can affect one's quality of life. Prostate gland enlargement (which is present above the urethra) can cause narrowing of the urethra, thereby putting pressure on the bladder's base. This can block the flow of urine [6]. Such obstructions may lead to lower urinary tract symptoms (LUTS) that sometimes result in urine being left behind in the bladder during urination [7]. Sudden onset of this symptom is named acute urinary retention. It is a very painful condition and is relieved temporarily by insertion of Foley's catheter to release the remaining urine. Chronic urinary retention is less common but can be dangerous due to the painless accumulation of urine inside the bladder. A rare form of chronic urinary retention is related to high bladder pressure, which can damage kidney's functioning [8]. Most urologists refer their patients to abdominal

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ultrasonography to evaluate PMR volumes. Sonographically, 5 different formulas are implemented to note PMRV. Research studies showed a 93.6% match amongst the outcomes of implemented methods [9]. BPH diagnosis is made when the subjects have a combination of medical symptoms of bladder outlet obstruction (BOO), micturiting frequency, reduced streaming, minor LUTS, and increased size of a prostatic gland on both physical and ultrasonographic exams [10]. Prostate ultrasonography was considered the best modality for such ailments and for taking biopsies, diagnosis, cancer stage marking, and evaluating therapy response [11,12].

METHODS

It was an analytical study consisting of a sample size of 220, performed at Sanabil Health Services Hospital, for four months. The study was performed from 15-6-2021 to 16-10-2021. Men of all ages diagnosed with BPH were a part of this research. The subjects with prostatic malignancies, who underwent mild urinary tract and/or prostate surgeries, and men with UTI or bladder calculi, were included in this experiment. Ultrasound study was performed using Toshiba Nemio17 ultrasound machine using curved array probe of 3.5-5 MHz. The outcome variables were Prostate volume and (PMR). Subjects were examined with their bladder full and PMRV was noted after micturition. The ellipsoid formula was used, (0.52 x wxhxl). Prostatic weights & volumes were about the same as the specific gravity of the prostate gland which is 1.05. One is an individual true measurement and the other is arithmetically solved.

RESULTS

Total of 220 individuals were scanned; out of them, 160 (72.7%) patients were diagnosed with benign prostatic hyperplasia and 60 (27.3%) patients had no signs of Benign Prostatic Hyperplasia. Total 220 individuals were scanned; out of them, normal PMRV was found in 75 (34.1%) patients and was raised in 145 (65.9%) patients. A significant mean difference of post-void volume was observed in patients with BPH and without BPH.As p-value is 0.008<0.05. A significant mean difference of pre-void volume was observed in patients with BPH as p-value= 0.000<0.05.(Table 1).

Indepenant Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig	t	df	Sig. (2-tailed)	Mean Difference	Stf. Error Difference	Lower	Upper
		F	Sig	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Pre-void Volume	Equal variances assumed	.052	.820	2.691	218	.008	52.72917	19.59522	14.10884	91.34949
	Equal variances not assumed			2.735	109.520	.007	52.72917	19.27715	14.52452	90.93381
Post-Residual Volume	Equal variances assumed	1.605	.207	6.090	218	.000	127.91188	21.00306	86.51684	169.30691
	Equal variances not assumed			6.609	126.044	.000	127.91188	19.35456	89.60990	166.21385

Table 1: Pre-void volume in patients with BMH and PMRV

BHP* PMRV Crosstabulation

			PMRV		Total	Sig
			Normal	Raised		
BPH	No	Count	43	17	60	.000
		% within BPH	71.7%	28.3%	100.0%	
	Yes	Count	32	128	160	
		% within BPH	20.0%	80.0%	100.0%	
Total		Count	75	145	220	
		% within BPH	34.1%	65.9%	100.0%	

Table 2: Cross tabulation of BMH and PMRV

DISCUSSION

We observe abdominal sonography is a reliable, harmless, and a fast modality for determining residual volume of urine in BPH patients. This disease is a cause of higher morbidity and difficulty in older males because of recurrent LUTS and may seriously impact the quality of life. It is a slowly-progressing ailment, usually featuring worsening of Lower Urinary Tract Symptoms over time [13]. Trans-abdominal sonography helps not only to evaluate the prostate gland but also the bladder, both kidneys, and both ureters. Pre and post-void residual urine can also be recorded. Prostate volumes, symptoms and ultrasound findings of kidneys, ureters and urinary bladder are crucial in making a decision. According to Basawaraj NG, et al., in 2015, there was a good but mild link between prostatic volumes and IPSS grades. Agrawal et al., in 2008, found no connection between size of the gland and IPSS scores [14]. In our research, there's a remarkable co-relation between PMRV and BPH. Eckhardt MD, et al., the most crucial considering point regarding predicting blockage is peak flow rate (Qmax). If it is >10 ml/sec, the blockage is 90% approx. If Qmax is between 10 and 14 ml/sec, then the blockage is 67% approximate obstruction. If Qmax > 15 ml/sec, there's only a 30% obstruction. In our study 160(72.7%) have BPH 60(27.3%) have normal prostate weight, 145(65.9%) with raised PMRV 75(34.1%) have normal PMRV [15]. Ruud Bosch JLH in 1995, the interlink between PMR volume and age was significant (P = 0.02). There is a poor relation between post-void residual urine values and size of prostate (r = 0.07; P = 0.35). In our research, there is a notable connection between post-void residual volumes and prostate gland weights [16]. Trumbeckas, et al., concluded in research that relation between prostate volumes and residual urine was notably poor (r = 0.198, p = 0.03) [17]. In our research, we examined interconnection between post-void residual urine volumes

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and prostate gland weights are remarkable because p-value of post-void residual volume and weight of prostate weight is (0.008) which is <0.05. Earlier data showed us that inter link between these volumes was notable with advancing ages and was remarkable with PMRV [18]. A study by S. Lee et al., in South Korea, was held to examine the effect of obesity in promoting BPH. It was found that men with high BMI and WC were positively associated with PV and central obesity is an important and independent risk factor of BPH [19]. According to our study 160(72.7%) have BPH 60(27.3%) have normal prostate weight, 145(65.9%) with raised PMRV 75(34.1%) have normal PMRV. A study performed by Yue L et al., in China showed the correlation between BMI, age, PV, IPSS and quality of life. It was observed that increasing BMI leads to decreased quality of life but PV increased with increasing BMI [20]. According to a study by J. Kellogg Parsons et al., obesity has a significant relationship to lack of physical exercise. Increased physical exercise is linked to a lower risk of BPH, adding to the findings of a correlation between obesity and BPH [21]. In our study BPH and significant correlation with age.

CONCLUSIONS

This study concluded that there is a significant correlation between PMRV and Benign Prostatic Hyperplasia i.e., with increasing prostatic weight, urinary retention increases.

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