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CORRELATION OF PROSTATIC VOLUME ASSESSED BY TRANSABDOMINAL USG WITH IPSS AND PSA LEVEL IN BLOOD IN BENIGN PROSTATIC HYPERPLASIA

KEY WORDS: First year and final undergraduates, adjustment, female student

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ABSTRACT

Objectives : To assess prostate volume by transabdominal ultrasonography, to correlate international prostate symptom score(IPSS) with sonographic prostate volume, to establish relationship among lower urinary tract symptoms (graded by IPSS), sonographic volume and blood PSA level in Benign Prostatic Hyperplasia(BEP).

Methods: This is a HOSPITAL BASED COMPARATIVE STUDY conducted in the department of Surgery, Silchar Medical College, SILCHAR.The duration of the study was 12 months starting from 1st June 2014 to 31st May 2015..There were 60 patients aged 47 to 85 years attending to surgery OPD or those who were admitted in surgery ward with Lower Urinary Tract Symptoms with

Inclusion criteria: 1. male patients of age above 40 years 2. patients with lower urinary tract symptoms viz, incomplete voiding, frequency, intermittency, urgency, weak stream, straining, nocturia, burning micturition and with Exclusion criteria:1. All male patients of age <40 years 2. known cases of prostatic carcinoma3. patients with blood PSA >10ng/ml 4. patients who have undergone previous prostatic surgery. All patients were investigated with all routine blood and urine examination ,serum PSA ,ultrasonography abdomen and pelvis.

Results: This study included 60 male patients with age ranging from 47 to 85 years with mean age of 67.48 years. Maximum numbers of patients were in the seventh decade of life constituting 38.33%.Commonest clinical presentation was increased frequency of micturition observed in 34 patients (27.4%), followed by nocturia observed in 30 patients (24.1%).

Maximum numbers of patients were in the moderate IPSS category. patients maximum number of patients had the prostate volume measuring 20-30cc observed in 17 patients(28.3%), followed by 16 patients (26.7%) who had the prostatic volume more than 50cc. The median lobe enlargement was observed in 7 patients and mean IPSS score in these patients was 26.14. in the remaining 53 patients there was no median lobe enlargement with mean PSS score of 17.30.50 patients (83.3%) had the PSA value less than 4 ng/ml, whereas only 10 patients (16.7%) had the PSA value >4ng/ml .In our study there was statistically significant correlation between prostatic volume and following symptoms of IPSS: incomplete emptying, intermittency, increased frequency of micturition, and nocturia.There was statistically significant correlation between blood PSA levels and the following symptoms of IPSS: incomplete emptying, increased frequency, intermittency and nocturia.In our study there was statistically significant correlation of prostate volume with blood PSA , prostate volume with IPSS and showed p value of <0.05.There was no correlation of prostate volume with age, IPSS with age and blood PSA level with age and showed p value of >0.05.

Conclusions: There is statistically significant correlation of prostate volume with blood prostate specific antigen and international prostate symptoms score in patients with benign prostatic hyperplasia. There is statistically significant correlation of international prostate symptoms score and blood prostate specific antigen in patients with benign prostatic hyperplasia. Prostate volume may be used as a surrogate marker for PSA levels in blood. Transabdominal ultrasonography is an easy tool for the assessment of prostate size in patients presenting with lower urinary tract symptoms.

INTRODUCTION

Prostate was first described by Messa in 16th century, but it was not until the 17th century that Riolan discovered that prostatic enlargement could obstruct the urinary outflow. Benign prostatic hyperplasia(BPH) is the most common benign tumor in men characterised by an increase in prostatic gland volume.

A six point scale developed by American Urological Association (AUA) grades the severity of symptoms in seven categories(frequently nocturia, weak stream, hesitancy, intermittent stream, incomplete emptying and urgency) with a total score of 35 indicating the most severe symptoms.

International prostate symptom score(IPSS) which is identical to AUA index, is recommended as a symptom scoring instrument to be used for baseline assessment of symptoms severity in men presenting with lower urinary tract symptoms(LUTS)5,6.

The clinical application of sonological measurement of prostatic volume and post voidal residual urine volume is in the evaluation of patients with LUTS including bladder outlet obstruction, acute urinary retention, obstructive uropathy and its complications.

The measurement of urinary flow rates can provide useful information in evaluation of patients, who present with obstructive symptoms. If maximum flow rate is greater than 15 ml per second, patients rarely have infravesical obstruction7.

This study is to correlate and establish relation among sonologically measured prostate volume, LUTS graded by IPSS and prostate specific antigen(PSA) levels in blood.

AIMS AND OBJECTIVES:
- To assess prostate volume by transabdominal ultrasonography.
- To correlate international prostate symptom score(IPSS) with sonographic prostate volume.
- To establish relationship among lower urinary tract symptoms (graded by IPSS), sonographic volume and blood PSA level in Benign Prostatic Hyperplasia(BEP).

MATERIALS AND METHODS:
- This is a HOSPITAL BASED COMPARATIVE STUDY conducted in the department of Surgery, Silchar Medical College, SILCHAR
- The duration of the study was 12 months starting from 1st June 2014 to 31st May 2015.
- There were 60 patients aged 47 to 85 years attending to surgery OPD or those who were admitted in surgery ward with Lower Urinary Tract Symptoms.

- **Inclusion criteria:**
1. male patients of age above 40 years
2. patients with lower urinary tract symptoms viz, incomplete voiding, frequency, intermittency, urgency, weak stream, straining, nocturia, burning micturition.

- **Exclusion criteria:**
1. All male patients of age <40 years
2. known cases of prostatic carcinoma
3. patients with blood PSA >10ng/ml
4. patients who have undergone previous prostatic surgery.

- **Investigations :**
1. haemogobin, total count, differential count
2. random blood sugar
3. kidney function test
4. routine examination of urine
5. serum prostate specific antigen(PSA)
6. Ultrasonography of abdomen and pelvis

statistical analysis: data analysis was carried out using Statistical Package for Social Science(SPSS V 10.5) package, Social Science Statistics Software.

Ethical Clearance: the study involved non invasive method of ultrasound examination to calculate the prostatic volume, clinical questionnaire for IPSS and obtaining blood samples for measuring blood PSA levels. Hence ethical clearance from ethical committee has been obtained.

Results and observations:
A total of 60 patients in the age group of 47 to 85 years with lower urinary tract symptoms were included in this study. Their prostatic volume was assessed by transabdominal ultrasonography. They were subjected to clinical assessment to evaluate their international prostate symptom score and laboratory analysis of their blood sample was done to evaluate prostate specific antigen levels.

The following observations were made during the study:

Table 1 : Age Distribution

40-49 years	3	5%
50-59 years	6	10%
60-69 years	23	38.33%
70-79 years	19	31.60%
80-89years	9	15%
Total	60	100%

The patients in this study were in the age group ranging from 47 to 85 years with mean age of 67.48 years. Maximum numbers of patients were in the seventh decade of life constituting

38.33% followed by eighth decade of life constituting 31.6%.

Table 2 : clinical presentation

Incomplete voiding	4	3.2%
Increased frequency	34	27.4%
Intermittency	3	2.4%
Straining	16	12.9%
Weak stream	12	9.7%
Urgency	13	10.5%
Nocturia	30	24.1%
Burning micturition	4	3.2%
Dribbling	5	4.0%
Acute retention urine	3	2.4%
Total	124	100%

Commonest clinical presentation was increased frequency of micturition observed in 34 patients(27.4%), followed by nocturia in 30 patients(24.1%)

Acute urinary retention was the least common mode of presentation observed only in 3 patients(2.4%).

Table 3: International prostate symptoms score grading: score 0-7 (mild), 8-19(moderate), 20-35 (severe)

Mild	7	11.7%
Moderate	31	51.7%
Severe	22	36.7%
total	60	100%

This table shows maximum numbers of patients in the moderate IPSS grade category . 31 patients (51.7%) were having moderate symptoms, 22 patients(36.7%) were having severe symptoms and 7 patients(11.7%) were having mild symptoms.

Table 4: CORRELATION OF MEDIAN LOBE ENLARGEMENT AND IPSS

correlation of median lobe enlargement	N	Mean IPSS	Standard deviation	min	max	t value	P value
Yes	7	26.14	6.64	15	33	2.37	0.02
No	53	17.30	9.50	2	35		
Total	60	18.33	9.60	2	35		

The median lobe enlargement was observed in 7 patients and mean IPSS in this patients was 26.14. and the remaining 53 patients there is no median lobe enlargement with mean IPSS score of 17.30. there was statistically significant correlation between median lobe enlargement and IPSS score with p value <0.05.

Table 5: PROSTATOMEGALY GRADING
Among 60 patients maximum number of patients had the prostate volume measuring 20-30cc observed in 17 patients (28.3%), followed by 16 patients(26.7%) who had prostatic volume more than 50cc.

<20cc	4	6.7
20-30cc	17	28.3
31-40cc	14	23.3
41-50cc	9	15
>50cc	16	26.7
Total	60	100%

Table 6: prostate calcification

Prostate calcification	Frequency	Percentage
No	55	91.7%
Present	5	8.3%
Total	60	100%

Out of total 60 patients, 5 patients(8.3%) showed prostatic calcifications on transabdominal ultrasonography

Table 7: Prostate Volume Distribution

N	60
Mean	42.35
Median	36.5
Mode	46
Standard deviation	20.24
Minimum	16
Maximum	108

Among the 60 patients the lowest prostate volume was 16cc and maximum volume was 108cc with a mean of 42.35cc and standard deviation of 20.24

Table 8: PSA LEVELS IN BLOOD AND ITS DISTRIBUTION

N		60
Mean		2.41
Median		1.66
Mode		1.31
standard deviation		1.85
Minimum		0.48
Maximum		8.33
Percentil	25th	1.02

es						
	50th			1.66		
	75th			3.22		
PSA at		Frequency	Percentage			
baseline(ng/ml)						
<_4		50	83.3			
>4		10	16.7			
Total		60	100%			

TABLE 8 shows that

PSA values were ranging from

0.48ng/ml to 8.33ng/ml, with a mean value of 2.41ng/ml and standard deviation of 1.85. 50 patients (83.3%) had the PSA value less than 4ng/ml whereas only 10patients(16.7%) had the PSA value more than 4ng/ml.

Table 9: Correlation of incomplete emptying with prostate volume and prostate specific antigen level

	Incomplete emptying	N	Mean	Standard deviation	minimum	Maximum	F value	P value
Prostate volume in cc	Not at all	30	33.47	14.75	18	89	5.00	0,004
	Less than 1 time in 5	0	-	-	-	-		
	Less than half the time	2	49	4.24	46	52		
	About half the time	9	45.8	16.52	26	83		
	More than half the time	0	-	-	-	-		
	Alm always	19	53.9	24.14	21	108		
PSA levels in blood	Not aostt all	30	1.50	0.932	0.51	3.9	7.48	0.0000
	Less than 1 time in 5	0	-	-	-	-		
	Less than half the time	2	3.06	0.212	2.91	3.21		
	About half the time	9	2.56	1.65	0.81	6.12		
	More than half the time	0	-	-	-	-		
	Almost always	19	3.71	2.33	0.48	8.33		

There was statistically significant correlation between prostate volume and incomplete emptying with P value<0.05. there was also statistically significant correltion between PSA and incomplete emptying wit p Value <0.05

Table 10: Intermittency with prostate volume and prostate specific antigen level

	Intermittency	N	Mean	Standardion	minimum	Maximum	F value	P value
Prostate volume in cc	Not at all	31	37.19	16.28	16	89	3.217	0.013
	Less than 1 time in 5	3	33.33	11.01	26	46		
	Less than half the time	1	26	0				
	About half the time	5	37.60	14.45	26	62		
	More than half the time	4	36.25	14.38	22	51		
	Almost always	16	58.6	24.46	21	108		

PSA levels in blood	Not at all	31	1.63	0.97	0.51	3.9	5.807	0.0000
	Less than 1 time in 5	3	1.84	1	1.02	2.96		
	Less than half the time	1	0.89					
	About half the time	5	2.40	1.9	0.94	5.3		
	More than half the time	4	2.26	0.67	1.62	3.21		
	Almost always	16	4.15	2.4	0.48	8.33		

There was statistically significant correlation between prostate volume and intermittency, P value <0.05. There was also statistically correlation between PSA and intermittency, P value<0.0001

Table 11: Correlation of frequency with prostate volume and prostate specific antigen level

		N	Mean	Standard deviation	minimum	Maximum	F value	P value
Prostate volume in cc	Not at all	11	30.63	8.31	18	42	4.274	0,002
	Less than 1 time in 5	2	23.5	3.53	21	26		
	Less than half the time	5	31.8	4.38	26	38		
	About half the time	9	31.67	12.33	16	46		
	More than half the time	3	48.67	7.57	40	54		
	Almost always	30	52.23	22.90	21	108		
PSA levels in blood	Not at all	11	1.34	0.60	0.63	2,70	2.99	0.019
	Less than 1 time in 5	2	0.87	0.02	0.86	0.89		
	Less than half the time	5	1.74	0.71	0.93	2.73		
	About half the time	9	1.69	1.02	0.61	3.21		
	More than half the time	3	2.44	0.57	1.81	2.91		
	Almost always	30	3.22	2.23	0.48	8.33		

There was statistically significant correlation between prostate volume and increased frequency of micturition, PSA and increased frequency of maturition with P value<0.05

Table 12: Correlation of urgency with prostate volume and prostate specific antigen level

	Urgency	N	Mean	Standard deviati	minimum	Maximum	F value	P value
Prostate volume in cc	Not at all	21	39.95	23.05	16	108	0.394	0,851
	Less than 1 time in 5	1	28	0				
	Less than half the time	1	63	0				
	About half the time	13	42.69	19.84	18	89		
	More than half the time	2	40.5	0,70	40	41		
	Almost always	22	44.32	19.37	18	83		
PSA levels in blood	Not at all	21	2.18	2.13	0.61	8.33	0.637	0.672
	Less than 1 time in 5	1	1.02	0				
	Less than half the time	1	4.36	0				
	About half the time	13	2.29	1.24	0.81	4.6		
	More than half the	2	1.52	0.41	1.23	1.81		

time					
Almost always	22	2.76	1.98	0.48	6.94

There was no correlation of prostate volume with urgency, P

value> 0.05

There was also no correlation of PSA with urgency, P value>0.05

Table 13: Correlation of weak stream with prostate volume and prostate specific antigen level

	Weak stream	N	Mean	Standard deviation	minimum	Maximum	F value	P value
Prostate volume in cc	Not at all	29	41.17	41.17	18	92	0.545	0,703
	Less than 1 time in 5	2	31.0	31	28	34		
	Less than half the time							
	About half the time	8	48.37	48.38	22	108		
	More than half the time	6	36.5	36.5	21	48		
	Almost always	15	45.27	45.27	16	82		
PSA levels in blood	Not at all	29	2.19	2.2	0.51	7.19	1.003	0.414
	Less than 1 time in 5	2	3.16	3.16	1.02	5.3		
	Less than half the time	0	0					
	About half the time	8	3.05	3.05	0.53	8.33		
	More than half the time	6	1.42	1.42	0.81	2.96		
	Almost always	15	2.78	2.79	0.48	6.94		

There was no correlation between Prostate volume and weak stream, P value >0.05. There was no correlation between PSA and weak stream, P value>0.05

Table 14: Correlation of straining to pass urine with prostate volume and prostate specific antigen level

	Straining to pass urine	N	Mean	Standard deviation	minimum	Maximum	F value	P value
Prostate volume in cc	Not at all	22	39.27	17.15	18	89	1.292	0,284
	Less than 1 time in 5	0	0					
	Less than half the time	1	28	0				
	About half the time	14	39.07	18.46	21	83		
	More than half the time	2	67	57.98	26	108		
	Almost always	21	46.09	20.15	16	92		
PSA levels in blood	Not at all	22	2.08	1.20	0.51	4.92	1.966	0.112
	Less than 1 time in 5	0	0	0				
	Less than half the time	1	0.62	0				
	About half the time	14	1.90	1.37	0.53	5.62		
	More than half the time	2	4.61	5.26	0.89	8.33		
	Almost always	21	2.96	2.18	0.48	7.19		

There was no correlation of either prostate volume or PSA level with straining to pass urine with both the P values >0.05

Table 15:Correlation of nocturia with prostate volume and prostate specific antigen level

	Nocturia	N	Mean	Standard deviation	minimum	Maximum	F value	P value
Prostate volume in cc	None	2	36.5	21.92	21	52	2.697	0,030
	1 time	2	45	8.48	39	51		
	2 times	11	40.90	24.25	16	89		
	3 times	12	30.91	9.35	18	46		
	4 times	15	37.86	12.89	24	62		
	5 times or more	18	54.94	23.78	21	108		
PSA levels in blood	None	2	1.88	1.45	0.86	2.91	3.991	0.004
	1 time	2	3.81	3.26	1.51	6.12		
	2 times	11	1.82	1.19	0.61	3.90		
	3 times	12	1.46	0.79	0.53	2.96		
	4 times	15	1.88	1.21	0.48	4.92		
	5 times or more	18	3.73	2.35	0.81	8.30		

There was a good correlation between prostate volume and PSA levels with nocturia with the p values being <0.05

Table 16: Distribution of IPSS, Prostate Volume and PSA according to AGE

	Age in years	N	Mean	Standard	minimum	Maximum	F value	P value
IPSS	40-49	3	17.33	9.50	8	27	0.110	0,978
	50-59	6	18.16	7.88	12	33		
	60-69	23	18.30	11.62	2	35		
	70-79	19	19.31	8.51	5	35		

	80-89	9	16.77	8.92	6	33		
Prostate volume in cc	40-49	3	29	9.85	21	40	1.802	0.142
	50-59	6	37.83	24.19	16	83		
	60-69	23	39	15.85	18	82		
	70-79	19	43.10	17.51	26	92		
	80-89	9	56.77	30.01	18	108		
PSA level in blood	40-49	3	1.41	0.49	0.86	1.81	1.754	0.151
	50-59	6	1.70	1.15	0.51	3.60		
	60-69	23	2.23	1.78	0.48	6.94		
	70-79	19	2.36	1.82	0.53	7.19		
	80-89	9	3.75	2.30	0.63	8.33		

Table 17: Correlation of prostatic volume with IPSS and prostate specific antigen level

		Prostate volume in cc	IPSS	PSA levels in blood
Age	Pearson correlation	0.3721	0.0305	0.3703
	P value	0.142	0.978	0.151
	N	60	60	60
Prostate volume in cc	Pearson correlation		0.4294	0.8173
	P value		0.000	0.000
	N	60	60	60
IPSS	Pearson correlation			0.4990
	P value			0.000
	N	60	60	60

There is statistically significant relation between prostate volume and PSA levels in blood, prostate volume and IPSS score, blood PSA levels and IPSS score as in all cases p value < 0.05

There is no correlation between prostate volume and age, IPSS score and age, blood PSA levels and Age, as in all cases P value>0.05.

Table 18: Increasing prostate volume as IPSS increases

		Mean prostate	Standard	mini	maxi	F value	P value
<25th percentile	14	30.36	8.81	16	48	36.108	0.0000
25th -75th percentile	30	34.9	10.27	18	54		
>75th percentile	16	67.06	20.89	30	108		

The above table shows increase in prostate volume as increase in IPSS severity

Table 19: Increasing prostate volume as the PSA increases

IPSS grading	N	Mean prostate volume in cc	Standard deviation	minimum	maximum	F value	P value
Mild	7	35.42	10.67	18	52	5.562	0.006
Moderate	31	36.35	15.60	16	89		
Severe	22	53.0	24.142	21	108		

DISCUSSION
A total of 60 patients older than 40 years with clinical history of lower urinary tract symptoms but not known cases of prostatic carcinoma or previous history prostatic surgery were included in study

In the study attempts were made to find correlation between prostatic volume assessed by Transabdominal utrasonography, and clinical symptoms score graded by international prostatic symptoms score, and prostate specific antigen level in blood

AGE DISTRIBUTION
The patient in this study were in the age group ranging from 47 to 85 years with a mean age of 67.48 years. Maximum number of patients were in the seventh decade of life constituting 38.33% followed by eight decade constituting 31.6%

This study is comparable to a large study by Anderson et al(1). Involving 39928 patients in the age group of 45 to 79 years with a mean age of 63.7 years.

An Indian study focusing on natural history lower urinary tract symptoms by Ganpule et. al.(2) on 2406 patients with the age group of more than 40 years showed age distribution comparable to our study.

Another study by Agarwal et al(3) showed mean age of 67.5 years in patient presenting with lower urinary tract symptoms which was also comparable to our study.

CLINICAL PRESENTATION
Commonest clinical presentation in our study was increased frequency of micturition observed in 34 patients(27.4%)followed by nocturia observed in 30 patients (24.1%)

Acute urinary retention was the least common mode of clinical presentation observed only in 3 patients(2.4%)

Anderson et al(1)study with large number of patients also showed that increased frequency of micturition is the common mode of presentation in patients with age group of less that 70 years and nocturia is the next common mode of presentation in the patient with more than 70 years of age.

An Indian studyby ganpaule et al(2) showed nocturia as the most common clinical symptom in the patient with history of lower urinary tract symptoms.

Our study is comparable to Anderson et al study for the common mode of clinical presentation in patient with lower urinary tract symptoms

INTERNATIONAL PROSTATE SYMPTOM SCORE GRADING
In our study maximum number of patients were in moderate IPSS grade category.

31 patients(51.7%)were having moderate symptoms, 22 patients(36.7%)were having severe symptoms and 7 patients(11.7) were having mild symptoms

A study by Overland et al(4) showed 23.6%of the patient has moderate symptoms and 5% of the patients had severe symptoms. In our study there was much higher IPSS severity than this study

A study by Tay et al(5) on 799 patient there were 67.6% of patient with IPSS of more than 8. whereas in our study 8.4%of the patient had IPSS score more than 8. in our study the probable cause for more number of patient with higher IPSS severity may be due to late presentation and due to habit of postponing health solution. Also the sample size taken in our study was small as compared to those studies.

PROSTATE VOLUME AND GRADING OF PROSTATOMEGALY
In our study among 60 patients maximum number of patients had the prostatic volume measuring 20-30cc observed in 17 patients(28.3%), followed by 16 patients(26.7%) who had the prostatic volume more than 50cc. The lowest prostate volume was 16cc and the maximum prostate volume was 108cc with the mean of 42.35cc and standard deviation of 20.24

A study of Collins et al(5) of 1627 patients on pattern of prostate enlargement on bening prostatic hyperplasia also showed that maximum number of patient had prostate volume ranging between 20-30cc

A study by Babiab et al showed 65.6% of the patient had the prostate volume between 25 to 50 cc, and 35.5%of the patient had prostate volume more than 50cc. Our study is comparable to both above studies.

The grading of prostatomegaly varies widely among various studies

Michael J. Barru et al(6) classified the prostate sixe based on the Transabdominal ultrasound as

1. Grade 1 – less than 50cc
2. Grade 2 – 50 to 80 cc
3. Grade 3more than 80cc

Aguirre et al. graded the prostate size based on the Transabdominal ultrasound as

- **Grade 1 –** less than 30cc

- **Grade 2 –** 30 to 50 cc

- **Grade 3 –** 50 to 80 cc

- **Grade 4 –** more that 80mcc

- Size of the prostate is very important because it helps in the decision making.
- Depending upon the baseline size of the prostate the urologist will decide whether the patient will require transurethral resection or open prostatectomy in symptomatic patient
- In prostates of size more than 70 to 80cc. Open supra pubic prostatectomy is easy to perform without much complications.

BLOOD PSA LEVELS AND ITS DISTRIBUTION
In our study blood psa values ranges from 0.48ng/ml to 8.33ng/ml with a mean value of 2.41±1.85ng/ml.

50 patients(83.3%) had blood PSA values of less than 4ng/ml, whereas 10 patients(16.7%) had more than 4ng/ml.

The exact cutoff value for an abnormal psa levels remains controversial. Generally a serum value of less than 4ng/ml is accepted as normal. Between 4 to 10ng/ml blood PSA levels can be due to BPH.

In our study when the patient's psa levels was more than 4ng/ml and abnormal digital rectal examination, in the form of hard consistency or nodules, was found, they underwent prostatic biopsy to rule out malignancy.

Ercole et al. and Hudson et. Al. showed in there study that 21% of patients with histologically confirmed BPH had serum PSA values more than 4ng/ml. in our study 16.7% of the patients had blood PSA values more than 4ng/ml which was slightly lower than the ercole et. al. and Hudson et. al. studies.

CORRELATION OF MEDIAN LOBE ENLARGEMENT AND IPSS
In our study the median lobe enlargement was observed in 7 patients and mean IPSS score in these patients was 26.14. in the remaining 53 patients there was no median lobe enlargement and the mean IPSS score in these patients was 17.30.

There was statistically significant correlation between median lobe enlargement and international prostate symptoms score with p value <0.05.

This indicates that when there is median lobe enlargement there is increase in the symptoms severity

CORRELATION OF INTERNATIONAL PROSTATE SYMPTOM SCORE WITH PROSTATE VOLUME
In our study there was statically significant correlation between prostatic volume and following symptoms of IPSS: incomplete empting (F=5.00, p<0.05), intermittency (F=3.217, P<0.05), increased frequency of micturition (F=4.274, p<0.05) and nocturia (F=2.697,p<0.05), but no statistically significant correlation was found between prostate volume and parameters of IPSS like urgency(p>0.05), week stream(p>0.05) and straining(p>0.05).

Above findings in our study indicate that increased volume is associated with greater propensity for the following symptoms of IPSS: increased frequency of micturition, incomplete emptying, intermittency and nocturia

Agarwal et. al.(3) in there study also found significant correlation between prostatic volume symptoms of IPSS; incomplete emptying and nocturia

CORRELATION OF INTERNATIONAL PROSTATE SYMPTOMS SCORE WITH BLOOD PSA LEVELS
In our study there was statistically significant correlation between blood PSA levels and the following symptoms of IPSS: incomplete emptying(F=7.48,p<0.05), increased frequency of micturation (F=2.99,p<0.05), intermittency (F=5.807, p<0.05) and nocturia (F=3991,p<0.05). But there was no correlation between blood PSA levels and other parameters of IPSS like urgency(p>0.05), week stream of urine(p<0.05) and nocturia(p>0.05)

Only a few studies have evaluated the relationship between PSA and IPSS. Favilla et. al. showed that PSA did not have a significant relationship with IPSS (pearson correlation coefficient=0.018, p=0.836).

Tsukamoto et. al. also reported in their longitudinal small population study that PSA has no significant correlation with the IPSS (correlation coefficient= -0.13, not significant). However, in our analysis, IPSS did have a significant relationship with PSA. Our study may be limited by its retrospective nature and also a small size of the sample taken for the study.

Correlation of prostate volume with IPSS and PSA levels in blood

- In our study there is significant correlation of prostate volume with blood PSA(r=0.817), p value of<0.05.
- Here is significant correlation of prostate volume with IPSS(r=0.429), p value of <0.05.
- There is no correlation of prostate volume with age (r=0.327), and p value of >0.05
- There is statistically significant correlation of IPSS with blood PSA(r=0.499), p<0.05
- There is no correlation between age and IPSS(t=0.0305), p>0.05
- There is no correlation between age and blood PSA levels(0.370), p>0.05a

Our study is comparable to various studies shown in the above

Study	Prostate volume with age	Prostate volume with IPSS	Prostate Volume with PSA	age	IPSS with age
Our study		R=+0.429		R=+0.370	
	r=+0.372		R=+0.817		R=+0.305
	P>0.05	P<0.05	P>0.05	P>0.05	P>0.05
Vesely et.				R=+0.28	
	R=0.25		R=+0.817		
Al.	P<0.001		P<0.001	P<0.001	
Seirra et al		R=+0.1966			
	R=+0.2864				R=+0.0498
	P<0.005	P<0.005			P<0.005
				P<0.001	
al		P<0.005			
et al		P<0.001			

table in terms of volume correlation of prostate volume with IPSS and PSA, only contraindication is with tsukamoto et al is which he did not found correlation between prostate volume with IPSS but in our study moderate correlation is noted

SUMMARY
This study included 60 male patients with age ranging from 47 to 85 years with mean age of 67.48 years. Maximum numbers of patients were in the seventh decade of life constituting 38.33% followed by eighth decade of life constituting 31.6%.

Commonest clinical presentation was increased frequency of micturition observed in 34 patients (27.4%), followed by nocturia observed in 30 patients (24.1%). Acute urinary retention was the least common mode of presentation in only 3 patients(2.4%).

Maximum numbers of patients were in the moderate IPSS category. 31 patients

(51.7%) were having moderate symptoms, 22 patients (36.7%) were having severe symptoms and 7 patients (11.7%) were having mild symptoms.

Among 60 patients maximum number of patients had the prostate volume measuring 20-30cc observed in 17 patients(28.3%), followed by 16 patients (26.7%) who had the prostatic volume more than 50cc. The lowest prostate volume was 16cc and the maximum was 108cc with mean volume of 42.35cc and standard deviation of 20.24.

5 patients showed prostatic calcifications on transabdominal ultrasonography which constituted 8.3% of the total patients.

The median lobe enlargement was observed in 7 patients and mean IPSS score in these patients was 26.14. in the remaining 53 patients there was no median lobe enlargement with mean PSS score of 17.30. There was statistically significant correlation between median lobe enlargement and IPSS score with p value of <0.05.

PSA values were ranging from 0.48ng/ml to 8.33ng/ml, with a mean value of

2.41ng/ml and standard deviation of 1.85. 50 patients (83.3%) had the PSA value less than 4 ng/ml, whereas only 10 patients (16.7%) had the PSA value >4ng/ml.

In our study there was statistically significant correlation between prostatic volume and following symptoms of IPSS: incomplete emptying, intermittency, increased frequency of micturition, and nocturia, but no statistically significant correlation was found between prostate volume and other parameters of IPSS like urgency, weak stream and straining.

There was statistically significant correlation between blood PSA levels and the following symptoms of IPSS: incomplete emptying, increased frequency, intermittency and nocturia. But there was no correlation between blood PSA levels and other parameters of IPSS like urgency, weak stream and straining.

In our study there was statistically significant correlation of prostate volume with blood PSA , prostate volume with IPSS and showed p value of <0.05.

There was no correlation of prostate volume with age, IPSS with age and blood PSA level with age and showed p value of >0.05.

CONCLUSION
There is statistically significant correlation of prostate volume with blood prostate specific antigen and international prostate symptoms score in patients with benign prostatic hyperplasia.

There is statistically significant correlation of international prostate symptoms score and blood prostate specific antigen in patients with benign prostatic hyperplasia.

There is no correlation between age and prostate volume.

There is no correlation between age and blood PSA levels.

There is no correlation between age and IPSS.

Prostate volume may be used as a surrogate marker for PSA levels in blood.

Transabdominal ultrasonography is an easy tool for the assessment of prostate size in patients presenting with lower urinary tract symptoms.

The major drawback of our study was the small size sample. Had it been a large sample of patients the results would have been much more precise.

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