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Study the role of various factors affecting the probable outcome of surgery in patients undergoing TURP for BEP, as measured by IPSS

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Abstract: ***Background& Objective****: Benign enlargement of prostate (BEP) is one of the most common reasons for surgery among older men.However, the prior studies showed no strong association between prostate size and its symptoms.*

The various therapeutic modalities intended to manage BEP patients encompass both medical and surgical interventions; Though till date clinical decision making remains the most valid instrument of patient selection for TURP, still the IPSS (International Prostate Symptom Score) and pressure-flow assessment scoring systems are being considered useful to exclude patients that are unlikely to benefit from the procedure. IPSS, an eight-question screening tool which includes seven questions relating to symptoms of the disease and one to the Quality of life is being used for the purpose of screening, rapid diagnosis, tracking and management of the symptoms of BEP.[9]

TURP despite being a definitive therapeutic modality, due to its variable outcomes in different patients suggests the degree of symptomatic improvement and an improvement of quality of life should be considered as the measures of clinical outcome. There have been several studies conducted to identify the relationship between different individual factors based on pre-operative findings and outcome. However, studies based on multiple factors are less. Thus, arises the need for present study. Hence the present study is intended to analyze the role and effect of factors based on clinical evaluation, non-invasive investigations, intra-operative findings such as age, prostate size, peak flow rate, pre-operative IPSS and bladder changes on the outcome of TURP as measured by mean change in IPSS and quality of life score; thereby serving as a guide to predict the prognosis of TURP in BEPpatients

Materials and Methods*: This is a prospective observational study. Study included 60 patients with symptomatic BPH availing the outpatient and inpatient services over 2 years. In this study we include diagnosed case of Benign Enlargement of Prostate with LUTS with obstructed flow confirmed by uroflowmetry and Patients who were not responding / not satisfied. Other causes of obstructive uropathy such as bladder or urethral calculi, meatal Stenosis, phimosis, stricture, and sclerosis, patients who present with acute retention of urine, diagnosed with renal failure/nephropathy, prostate cancer,perviousprostatesurgery,patientslosttofollowup,whodidn'thaveall preoperative parameters were excluded from thestudy.The outcome was obtained by comparing the mean change in IPSS (pre- and post-operatively at 3months) with age, PFR, prostate size, pre-op IPSS, and bladder changes*

Results:*TURP in all patients resulted in improvement in IPSS, QOL and PFR. However, the results are observed with certain variability in terms of improvement in symptom scores. Results showed that the improvement in IPSS is independent of age and prostate size did not affect the outcome of TURP. We have observed that there was significant difference in mean IPSS change with degree of obstruction*

Conclusion*:TURP in all patients resulted in improvement in IPSS, QOL and PFR. However, the results are observed with certain variability in terms of improvement in symptom scores. Improvement in IPSS are independent of Age and prostate size. Pre-op IPSS, Degree of obstruction measured by uroflowmetry are simple non-invasive investigations which can predict the outcome. Results are comparable with studies from literature and within component of IPSS showed higher improvement in obstructive symptoms are observed.*

Keywords*: TURP, IPSS, QOL, PFR, BPH*

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I. Introduction

Benign enlargement of prostate (BEP) is hyperplasia of the stroma and epithelium of prostate, a walnut shaped tubulo-alveolar exocrine gland of male reproductive system[1]. Diffuse enlargement of prostate occurs at puberty, and focal growth in periurethral area usually after the age of 55yrs leading to the formation of large peri-urethral nodules within the gland, which in turn results in bladder outlet obstruction (BOO) in men.[2,3] It is one of the most common reasons for surgery among older men[4.] However, prior studies showed no strong association between prostate size and itssymptoms[5].

The various therapeutic modalities intended to manage BEP patients encompass both medical and surgical interventions; medical therapy using 5- alpha-reductase inhibitors and alpha blockers to improve lower urinary tract symptoms (LUTS) and follow up with measurement of peak flow rate being considered the first line of management[6]. Transurethral Resection of Prostate (TURP) still represents the gold standard of management of BEP for patients with bothersome moderate or severe LUTS who either request active treatment or who fail or do not want medical therapy, with decreasing complication rates.[7,8] Though till date clinical decision making remains the most valid instrument of patient selection for TURP, still the IPSS (International Prostate Symptom Score) and pressure-flow assessment scoring systems are being considered useful to exclude patients that are unlikely to benefit from the procedure.

IPSS, an eight-question screening tool which includes seven questions relating to symptoms of the disease and one to the Quality of life is being used for the purpose of screening, rapid diagnosis, tracking and management of the symptoms of BEP.[9.]

In addition, age is an important predictor of improvement of symptoms and flow rates during the postsurgical period[10] as with advancing age there is decreasing urinary flow rates, and poorer resultsoverall.[11]

Though Uroflowmetry is being developed to predict the rate of progression of male LUTS[12], it is yet to be determined whether Uroflowmetry tests overestimate or underestimate the „true level" of *Qmax*for that individual; the data suggests that there may be a level of inaccuracy associated with single flow measurements and that more than one reading should be probably undertaken. Maximum flow rate, one of the most useful parameters in determining the prognosis, can vary significantly in accordance to the volume of the voided urine, time of the day, season of the year and ambient temperature.[13]

TURP led to an improvement in the maximum flow rates and LUTS even in BPH patients without BOO; implying that it can be expected to improve LUTS even in those BPH patients without definitive urodynamic obstruction.[14] However a weak correlation was identified between the severity of BOO preoperatively and the outcome of the TURP; hence the critical role of other

factorslikeseverityofpatient'ssymptomsfordecidingtreatmentmodalityand confirming pre grade of TURP bladder trabeculation for predicting improvement in voiding symptoms and planning postsurgical medication in addition to BOO isobserved.[15,16]

TURP despite being a definitive therapeutic modality, due to its variable outcomes in different patients suggests the degree of symptomatic improvement and an improvement of quality of life should be considered as the measures of clinical outcome. There have been several studies conducted to identify the relationship between different individual factors based on pre-operative findings and outcome. However studies based on multiple factors are less. Thus arises the need for present study. Hence the present study is intended to analyze the role and effect of factors based on clinical evaluation, non-invasive investigations, intra-operative findings such as age, prostate size, peak flow rate, pre-operative IPSS and bladder changes on the outcome of TURP as measured by mean change in IPSS and quality of life score; thereby serving as a guide to predict the prognosis of TURP in BEPpatients.

II. Material and Methods

The present study is a prospective observational study conducted in the patients with symptomatic BPH availing the outpatient and inpatient services at the Department of General Surgery, TATA Motors Hospital, Jamshedpur, Jharkhand after obtaining clearance from the institutional ethics committee and an informed consent from thepatients.

Study period-The study was conducted over a period of twoyears.

Study type- The present study prospective observational study conducted to analyze the role of various factors in predicting the outcome of patients undergoing TURP for BEP, as measured by mean change in IPSS.

Sample size:

For present study formula which used for calculation of sample size is:

$n= [Z^2 \times (pxq)/d^2]$

n= minimal sample size

z= linked to 95% confidence interval (used1.96) p= expected prevalence (fraction of 1)

q= 1-p (expected non prevalence) d= relative desired precision

A total of nearly 65 patients of BEP availing the hospital services during the study period and fulfilling the inclusion and exclusion criteria were included in the study. All the patients underwent TURP in our hospital, and all surgeries were conducted by single surgeon. Two of the patients were lost to follow-up, and post operatively HPE came out to be prostate malignancy in 3 patients who were excluded from the study.
So considering the following:
Study duration- 2 years Follow up period- 3months Population- 60
Confidence limit- 95%
Confidence interval- 5

inclusioncriteria:
Diagnosed case of Benign Enlargement of Prostate with LUTS:
1. Patients who were not responding/not satisfied with medicaltherapy.
2. Patients with confirmed BOO byUroflowmetry.

Exclusioncriteria:
1. All patients in whom preoperative parameters could not be assessed (as mentioned in Studyproforma).
2. Other causes of obstructive uropathy such as bladder or urethral calculi, meatal Stenosis, phimosis, stricture, andsclerosis.
3. Patients who present with acute retention ofurine.
4. Patients diagnosed with renalfailure/nephropathy.
5. Prostatecancer.
6. Previous prostatesurgery.
7. Patients lost to followup.

- **Preoperativeevaluation:**

1.All the BEP patients under study are evaluated thoroughly by clinical history taking and complete examination including digital rectal examination (DRE) followed by symptom scoring withIPSS.
2.Peak flow rate, Average flow rate, Volume by Uroflowmetry for assessing degree of obstruction (BOO). Considered PFR in our study if voiding volume more than150ml[60].
3.Ultrasonography is used for determining the weight of prostate and post void residual urinevolume.
4.Cystoscopy is performed at the time of TURP for the evaluation of prostate enlargement and bladderchanges.
5.All pre-an aesthetic investigationof
a) Complete hemogram (Hb%, TLC, DLC, Platelet count, CT, BT, PT,INR)
b) Blood glucose levels (Fasting & Postprandial)
c) Serum electrolytes (Na^+,K^+)
d) Renal function tests (Blood urea, Serumcreatinine)
e) SerumPSA
f) Screening (HIV, HBSAG, HCV)
g) Urine routine and microscopy
h) Urine culture and sensitivity
i) Chest Xray
j) ECG
6. After pre-an aesthetic clearance and with valid consent patients were taken up for transurethral resection of prostate under regional anesthesia

- Surgical Procedure:

Instruments used-
- Lens30^0
- Cystoscope
- Resectoscope sheath 24fr or28fr.
- High frequency electrodes (band loop electrode & roller electrode) with monopolar technology.
- Ellik"sevacuators
- Xylocaine jelly2%
- Glycine solution in sterilepack
- Tri way Foley"s catheter for continuous glycineirrigation.
- Fiber optic cable with camera lens andmonitor.

Anesthesia

The procedure was performed under spinal regional anesthesia in all patients.

Preparation:

Under full aseptic conditions the parts were shaved and prepared on the day of surgery. Pre-op antibiotic prophylaxis (2nd generation cephalosporin in combination with gentamycin) was given 30 min before surgery in every patient.

Position of the patient:

The patient was positioned supine on the table in lithotomy position so that the surgeon could stand between the spread-out and abducted legs held in semi flexed knees andhips.

Position of the screen:

The screen was placed on the left side of the operating table.

Surgical technique[17]:

All procedures are done by Nesbit's technique. The standard cystoscopy is performed with a 30-degree lens cystoscope introduced per urethra after lubricating it with 2% xylocaine jelly under control in visual guidance. Urethrocystoscopy was done, relevant anatomy and findings about the ureteral orifices, the bladder neck, bladder changes, prostate enlargement, the location of the verumontanum, and external urethral sphincter werenoted.

Then the urethra is calibrated with bougie of up to 28 Fr. 28 Fr resectoscope sheath is used. If required, the area of narrowing at the post navicular region of urethra is relieved with dorsal internal urethrotomy by using a curved no-12 scalpel blade.

After preliminary endoscopy and urethral calibration, the bladder is filled with 1.5% glycine and irrigation continued throughout the procedure.

Stage 1:

The resection starts at the bladder neck at the anterior quadrant of 12- o'clockpositionandcarrieddowntothe9-o''clockpositioninstepwisefashion, thenfromthe12to3-o''clockisresected.Theposteriorquadrantsarethen individually resected, down to the 6-o''clock position. The adenoma is resected down to the level where the apparent circular fibers of bladder neck visible. If at the completion of entire resection, the bladder neck appears to be partially obstructing, particularly with small glands, then incision is given on the bladder neck with Collings knife at the 6-o'' clock position.

Stage 2:

The resectoscope is placed in front of the verumontanum. The resection beginsat12o'clock, andiscarriedoutintheclockwisedirection. Care is taken not to resect too deeply in the region of the posterior aspect of vesical neck, as fibers of capsule become less prominent and chances of perforation arehigh.

Stage 3: The adenoma is removed immediately proximal to the external sphincter mechanism, preserving the verumontanum with sweeping motions from lateral to medial direction as it approaches the sphincter mechanism. Care is taken at 12 o'clock position as there is risk of damage to the external sphincter.

When resection is completed, resectoscope is pulled back just distal to the verumontanum, and any small wings of adenoma are trimmed judiciously.

At the end of the procedure prostatic chipsare retrievedwithEllik''s evacuator, which are sent for biopsy. Arterial bleeding is controlled with electrocoagulation. Venous bleeding is controlled by placing No.21 triwayFoley''scatheterontractionwithinflationofballoonto50ccvolume.Glycine irrigation is continued for24hrs.

- Post-operativecare**:**

Glycine irrigation is continued along with traction on catheter for 24 hrs. Color of irrigated fluid is observed for active bleeding, which should be light pink normally. Depending on the volume of resected prostate and operative time, we check the Hb% and serum electrolytes post-operatively. On 2nd POD catheter is removed and patient discharged if he voidsurine.

- Post-operativefollow-up:

Histopathology report of all patients was followed up to rule out malignancy. At the end of three months, all patients were evaluated by symptom scoring with IPSS and quality of lifescore.

- Method of dataanalysis:

Factors under study were based on clinical evaluation, non-invasive investigations and intra-operativefindings:

1.Age
In order to study the role of age the sample is divided in to two groups. In one group patients of age less than or equal to 60 years and in another group greater than 60 years patients were included.

2. Peak flow rate(PFR/Qmax)
To assess the severity of obstruction the patients included in the study are subdivided in to two groups. First was definitive obstructed flow group with PFR less than or equal to 7ml/sec, while second group was equivocal or unobstructed patients with PFR greater than 7ml/sec.[23,19\]
3. Prostate size by USGevaluation.
Prostate size was determined by using USG and the sample was divided into two groups. In one group patients with prostate size less than or equal to 60cc and in other group patients with prostate size greater than 60cc were included.
4. Pre-opIPSS
To assess the pre-op IPSS evaluation on outcome sample was divided into three groups. In group one patients with mild symptoms (IPSS 0-8), in group two patients with moderate symptoms (IPSS 9-19), and in group three patients with severe symptoms (IPSS 20-35)[10] were included.
5. Bladder changes oncystoscopy.
Intra operative bladder changes noted according to Establishment of the Novel Cystoscopic classification for Bladder trabeculation[69] and the sample was divided in to fourgroups.
Group 0 Patients with normal findings,
Group 1 mild trabeculations,
Group 2 moderate trabeculations,
Group 3 severe trabeculations.

- Studyoutcome:

The outcome was obtained by comparing the mean change in IPSS (pre and post-operatively) with age, PFR, prostate size, pre-op IPSS, and bladder changes.

- Statisticalanalysis

Data was entered in MS Excel work sheet and all descriptive data was expressed as mean and standard deviation. For comparison of binominal or discrete variables Chi-square test was used while for continues variables, Student's t-test (for independent sample) was used.
Probability value(„p"value) was calculated with the help of the software, MSEXL sheet, IBM-SPSS 20.0 for Windows, (IBM Corp. Released 2011. IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp.)
„p"value <0.05wasconsideredtobesignificant.

III. Result

The study was conducted from 1st December 2012 to 1st December 2014 in the Department of General surgery, TATA Motors Hospital, Jamshedpur.

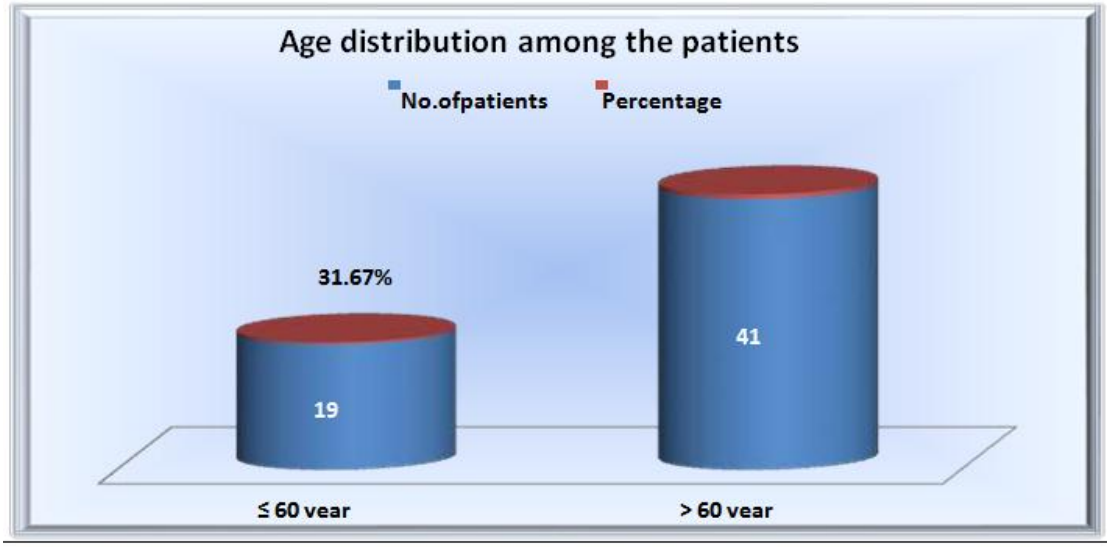
A total of 65 patients of BEP availing the hospital services during the study period and fulfilling the inclusion and exclusion criteria were included in the study. The observations were recorded as per proforma. All the patients underwent TURP after pre-operative evaluation in our hospital, and all surgeries were conducted by single surgeon. They were subsequently followed-up regularly in SOPD for next three months. Two of the patients were lost to follow-up, and post operatively HPE came out to be prostate malignancy in 3 patients who were excluded from the study. Finally, there were 60 patients who completed the study and these results were analyzed.

Demographic Parameters
1.Age:
The mean age of patients ($\mu \pm \delta$) = 64.17 ± 6.07.
No.of patients in group 1 (≤60 years) were 19(31.67%)
No.of patients in group 2 (>60 years) were42(68.33%)
Table no.:01
Age distribution among the patients

Age (in years)	Total no. of patients (N= 60)	Percentage
Group 1 (≤60 years)	19	31.67%
Group 2 (>60 years)	41	68.33%

Overall Mean ± standard deviation among the patients are (μ ± δ) = 64.17 ± 6.07

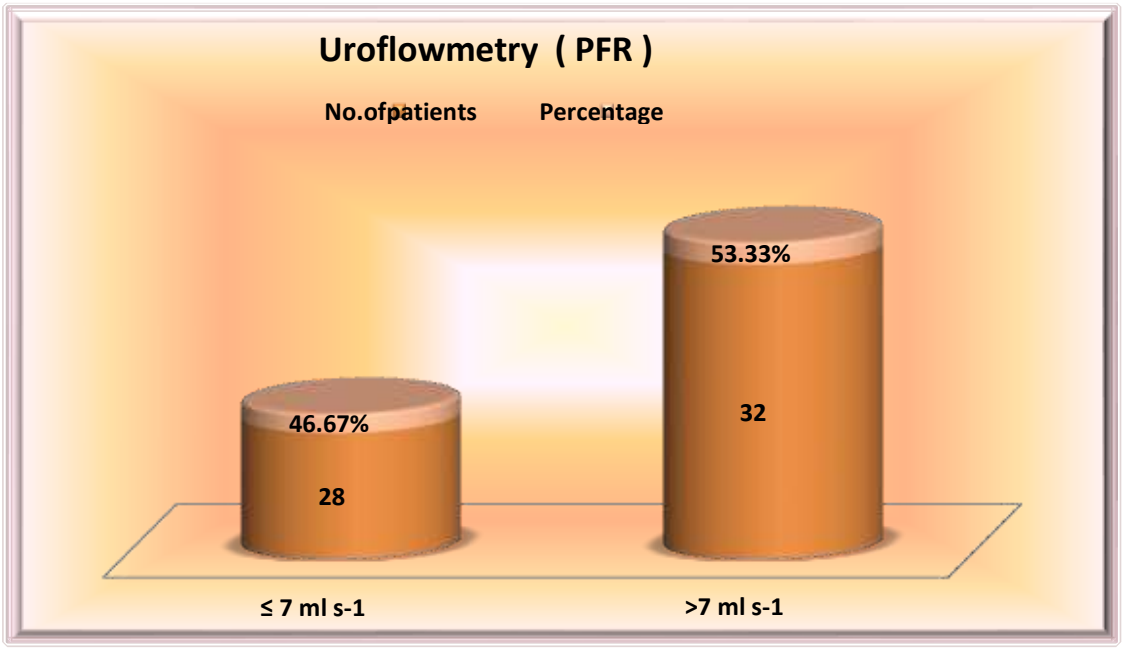
Graph 1: Age distribution among the patients



2. **Uroflowmetry:**
In group 1 (≤7ml/s) there were 28(46.67%) while group 2 had (>7ml/s) 32 patients (53.33%).

Table no.:02 Uroflowmetry (PFR)

PFR	No. of patients	Percentage
Group 1 (≤ 7 ml s^{-1}	28	46.67%
Group 1 (>7 ml s^{-1}	32	53.33%



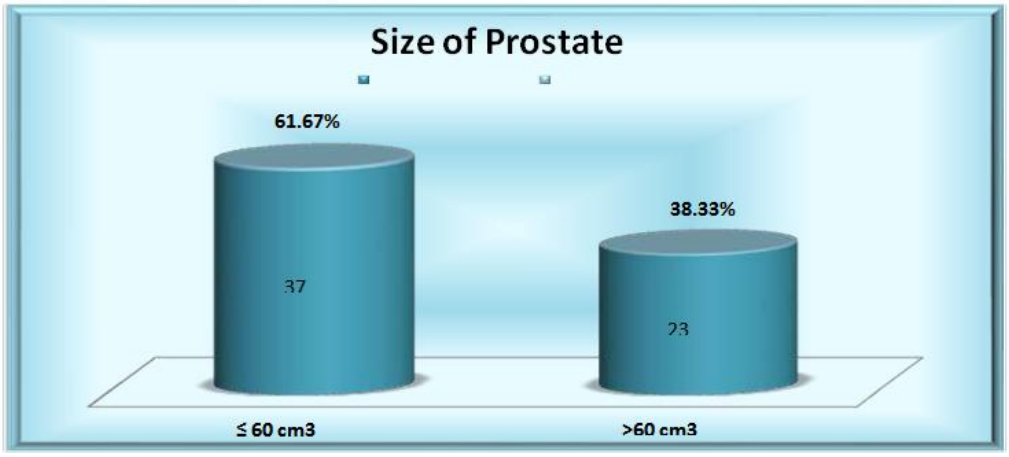
Graph 2: Peak flow rates distribution among the patients.

3. Size ofProstate
In group 1 (≤60cm^3) no. of patients was 37(61.67%) while in group 2 (>60cm^3) no. of patients was 23(38.33%).

Table no.:03 Size of Prostate:

Size	No. of patients	Percentage
Group 1 (≤ 60 cm^3)	**37**	**61.67%**
Group 2 (>60 cm^3)	**23**	**38.33%**

Graph 3: Distribution of patients according to size of prostate

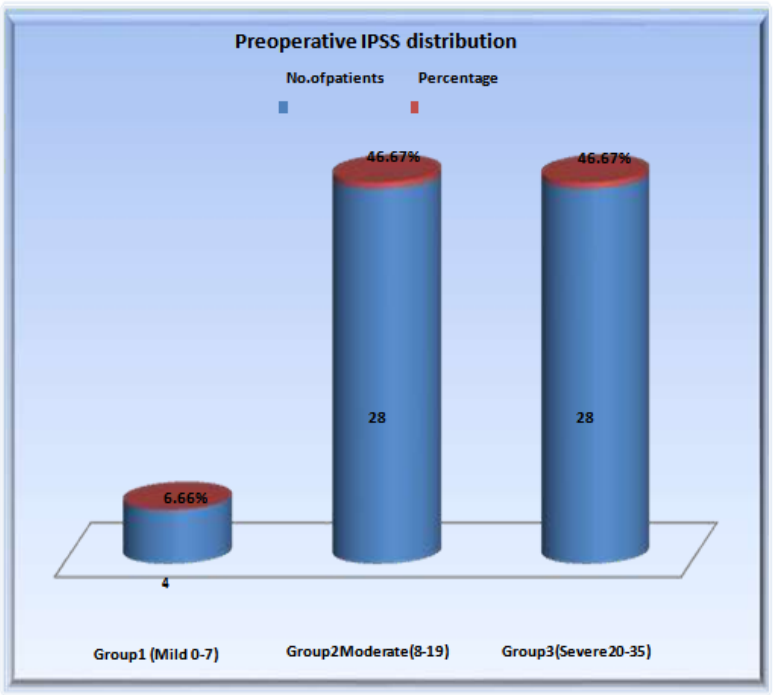


4. Pre op IPSS distribution inpatients:
In group 1 there were 4(6.66%), in group 2 there were 28(46.67%) and in group 3 there were 28(46.67%) patients.

Table no. : 04

Pre op IPSS distribution	No. of patients	Percentage
Group 1(Mild 0-7)	4	6.66%
Group 2(Moderate8-19)	28	46.67%
Group 3(Severe 20-35)	28	46.67%

Graph 4: Distribution of patients according to pre-operative IPSS evaluation.

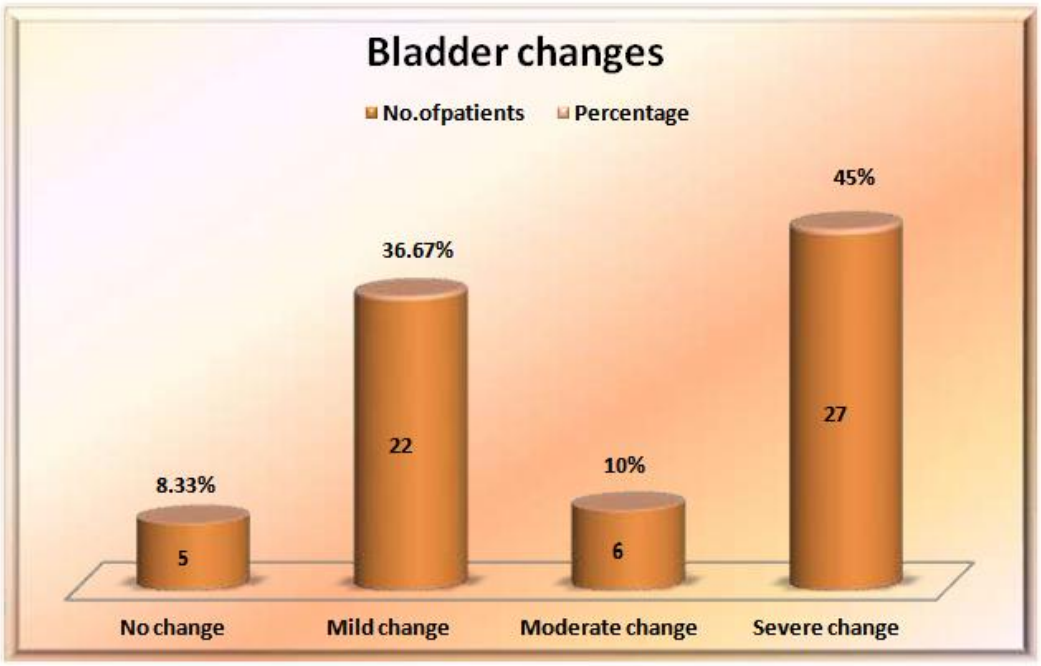


5. Distribution of bladder trabeculations based on cystoscopicfindings:
According to established bladder trabeculation grade classification method[24] there were 5 patients in group 0. (8.33%), 22 patients in group 1 (36.67%), 6 patients in group 2 (10%) and 27 patients in group 3 (45%).

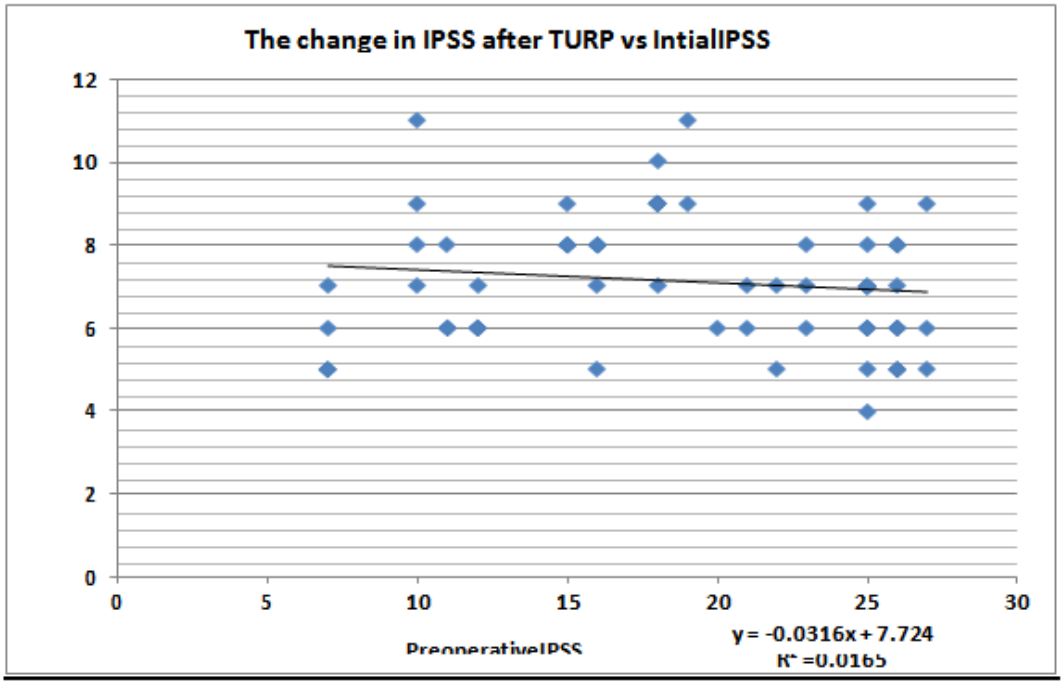
Table no. : 05
Bladder trabeculations

Bladder changes	No. of patients	Percentage
Group0 (No.change)	5	8.33%
Group1 (Mild trabeculations)	22	36.67%
Group 2(Moderate trabeculations)	6	10%
Group 3(Severe trabeculations)	27	45%

Graph 5: Distribution of patients according to Bladder trabeculations.



In all the patients in present study, when the change in IPSS after TURP as compared to initial IPSS were plotted on a scatter diagram, the line of regression was positively correlated with r=0.128 (if r >0.5 strongly correlated where **r** is Karl Pearson Correlation Coefficient). Hence the study progressed to analyze the different parameters in relation to overall effect on the outcome of TURP.



Graph 6: **'r'** (Karl Pearson Correlation Coefficient) = 0.128 (if r >0.5 then strongly correlated)

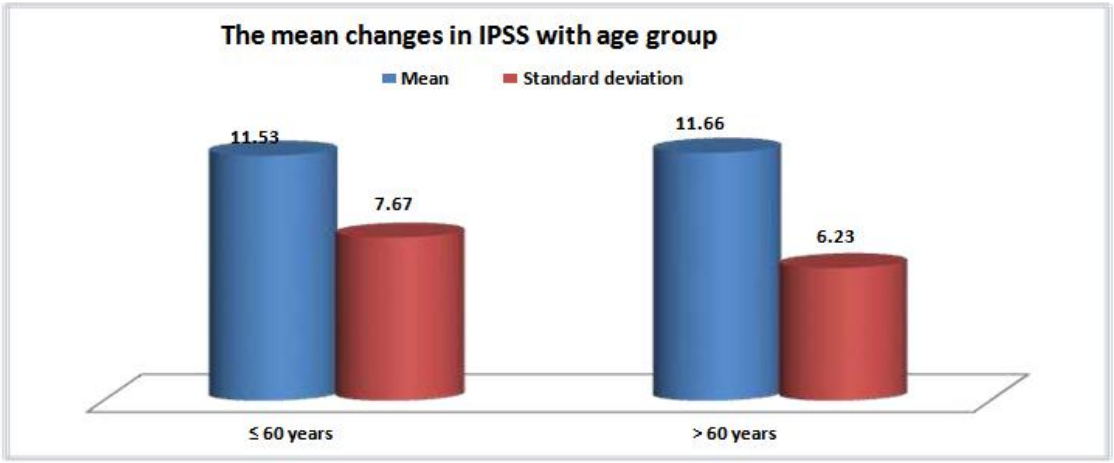
i) **The change in IPSS between different agegroups**

The change in IPSS in group 1 (≤ 60 year) was 11.53±7.67 and in group 2 (>60 year) was 11.66±6.23. Statistical analysis showed t-value of 0.0698 and p-value of 0.9446. Thus there was no significant difference in the mean change in IPSS whether relatively less age group ≤ 60 years or in the advanced age group >60 years. Thus in our study the age of the patient did not affect the outcome of surgery.

Table no.: 06

Parameter	Group 1(≤ 60 years)	Group 2(>60 years)
Mean change in IPSS	11.53	11.66
Standard deviation	7.67	6.23

Mean ± Standard of IPSS change with respect to age (≤ 60 years) (μ ± σ) = 11.53 ± 7.67
Mean ± Standard of IPSS change with respect to age (>60 years) (μ ± σ) = 11.66 ± 6.23
There was statistically no significant difference in mean change in IPSS between the two groups according to their age, with p-value =0.9446.



Graph 7: Mean changes in IPSS with age group

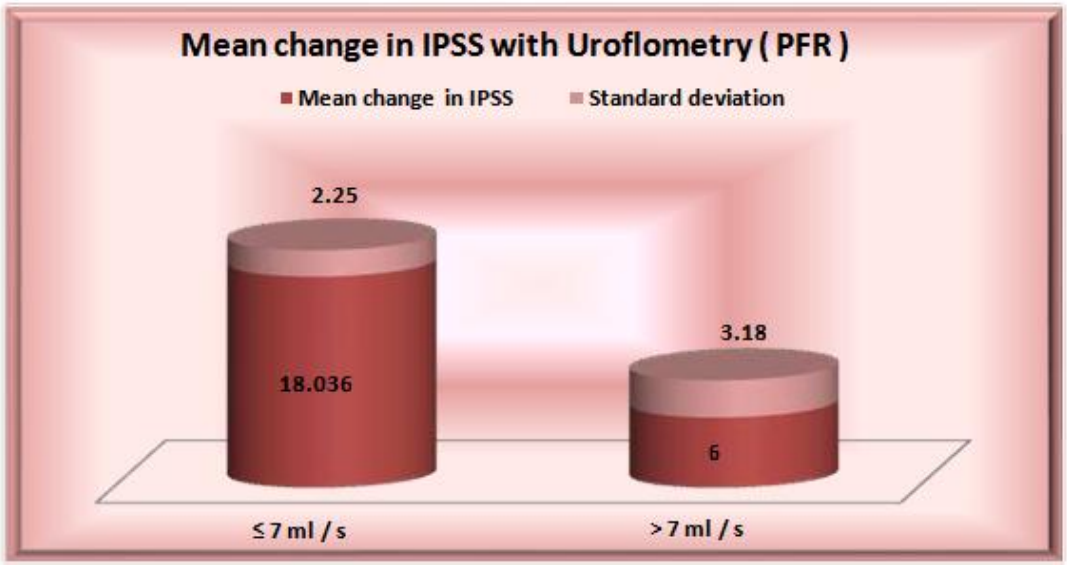
!!) The change in IPSS with different degrees of BOO as measured by peak flowrates:

In Group 1 ($\leq$ 7 ml s^{-1}) the change in IPSS was 18.036±2.25 while in Group 2 (>7 ml s^{-1}) it was 6±3.18. On analysis t-value was 1.96 with p-value <0.0001. Thus, there was statistically significant difference in mean change in IPSS between two groups according to their PFR. With definite obstruction ($\leq$7 ml s^{-1}) the results were significantly better as compared to equivocal or unobstructed urinary flow (>7 ml s^{-1}).

Table no. : 07

PFR	Change in IPSS	
	Mean change in IPSS	Standard deviation
Group 1 $\leq$ 7 ml s^{-1} (n = 28)	18.036	2.25
Group 2 >7 ml s^{-1} (n = 32)	6	3.18

Mean ± Standard Deviation of IPSS change with respect of PFR ($\leq$ 7 ml s^{-1}) ($\mu \pm \sigma$) = 18.036 ± 2.25
Mean ± Standard Deviation of IPSS change with respect of PFR (>7 ml s^{-1}) ($\mu \pm \sigma$) = 6 ± 3.18
There was statistically significant difference in mean change in IPSS between two groups according to their PFR, with p – value {p < 0.0001}



Graph 8: Mean change in IPSS with Uroflowmetry (PFR)

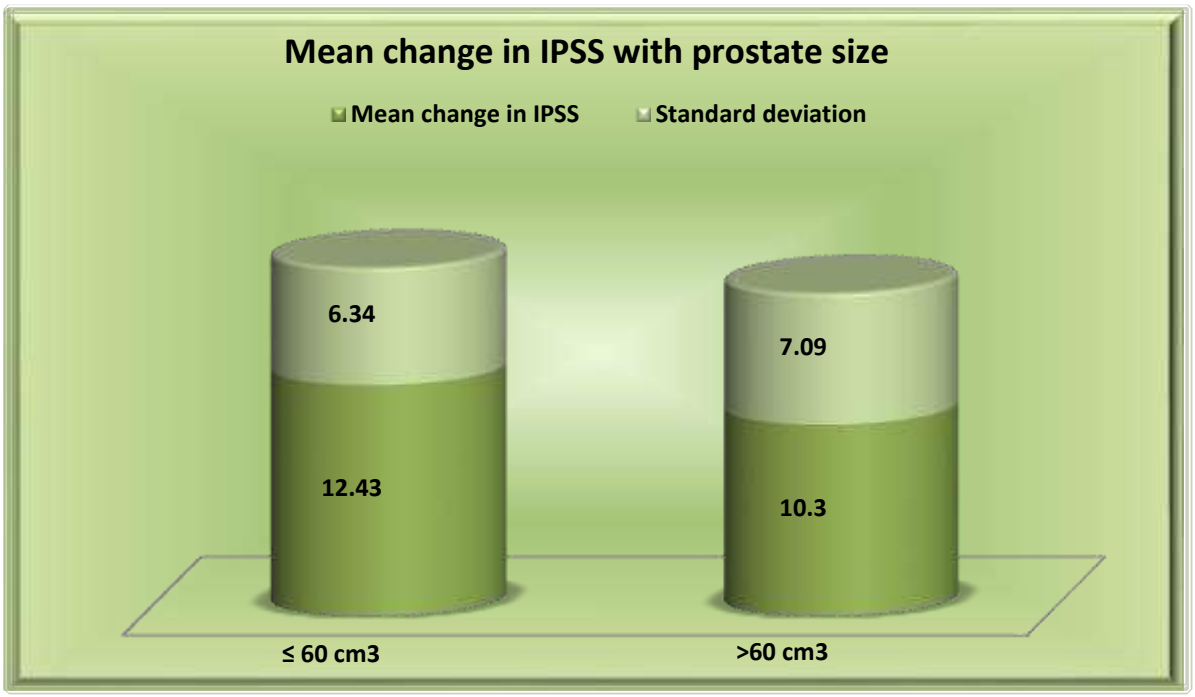
iii) **The change in IPSS with Prostate size onUSG**:

The change in IPSS with prostate size in group 1 ($\leq$ 60 cm^3) was 12.43±6.34 and in group 2 (>60 cm^3) was 10.30±7.09. Statistical analysis showed t-value of 1.96 and p-value of 0.2315. Thus there was no significant difference in the mean change in IPSS whether in relatively smaller prostate size group $\leq$ 60 cm^3 or in the relatively larger prostate size group $\geq$ 60 cm^3. Thus in our study the prostate size of the patient did not affect the outcome of surgery.

Table no. : 08

Prostate size	Change in IPSS	
	Mean change in IPSS	Standard deviation
$\leq$ 60 cm^3 (n = 37)	12.43	6.34
>60 cm^3 (n = 23)	10.30	7.09

Mean ± Standard of IPSS change with respect of Prostate size ($\leq$ 60 cm^3) ($\mu \pm \sigma$) = 12.43 ± 6.34
Mean ± Standard of IPSS change with respect of Prostate size (> 60 cm^3) ($\mu \pm \sigma$) = 10.30 ± 7.09
There was statistically no significant difference in mean change in IPSS between two groups according to their prostate size, with p-value = 0.2315.



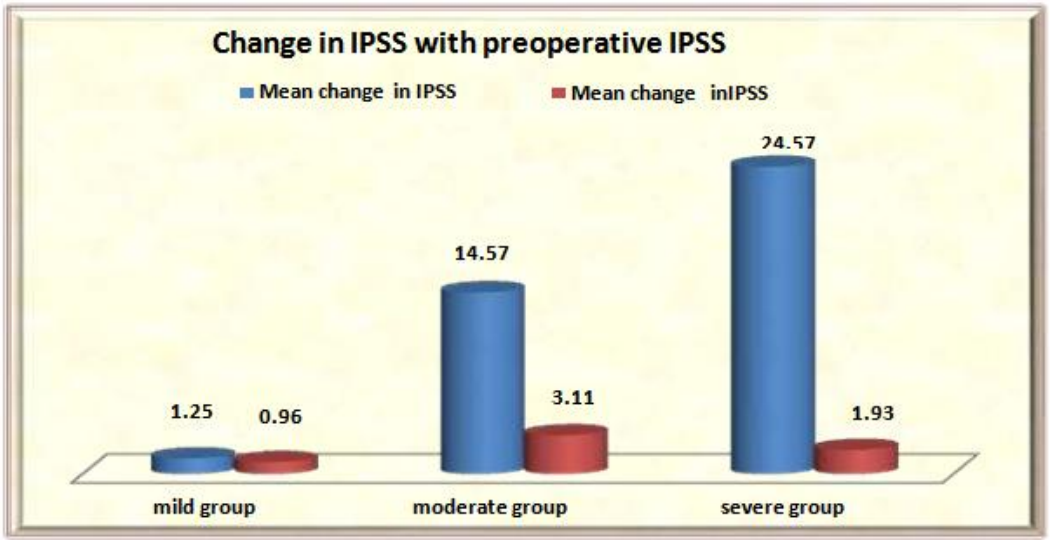
Graph 9: Mean change in IPSS with prostate size

iv) The change in IPSS in relation to PreoperativeIPSS:
Mean change in IPSS with group 1(mild≤8) of pre- operative IPSS was 1.25±0.96, in group 2 (moderate 9-19) was 14.57±3.11 and in group 3(severe 20-35) was 24.57±1.93. Analysis showed that mean change in IPSS to be significantly more in group 3 as compared to rest of the two groups with p- value <0.005.
Table no.: 9

The change in IPSS with Preoperative IPSS

Preoperative IPSS	Mean change in IPSS	
	Mean	Standard deviation
group 1(mild:0-8)	1.25	0.96
group 2(moderate:9-19)	14.57	3.11
group 3(severe:20-35)	24.57	1.93

1)There was a statistically significant difference between the severe group with mild group according to their preoperative IPSS, with $p < 0.05$ ($p < 0.0001$).
2)There was statistically HIGHLY significant difference between the severe group with moderate change group according to their preoperative IPSS, with $p < 0.05$ ($p < 0.0001$)



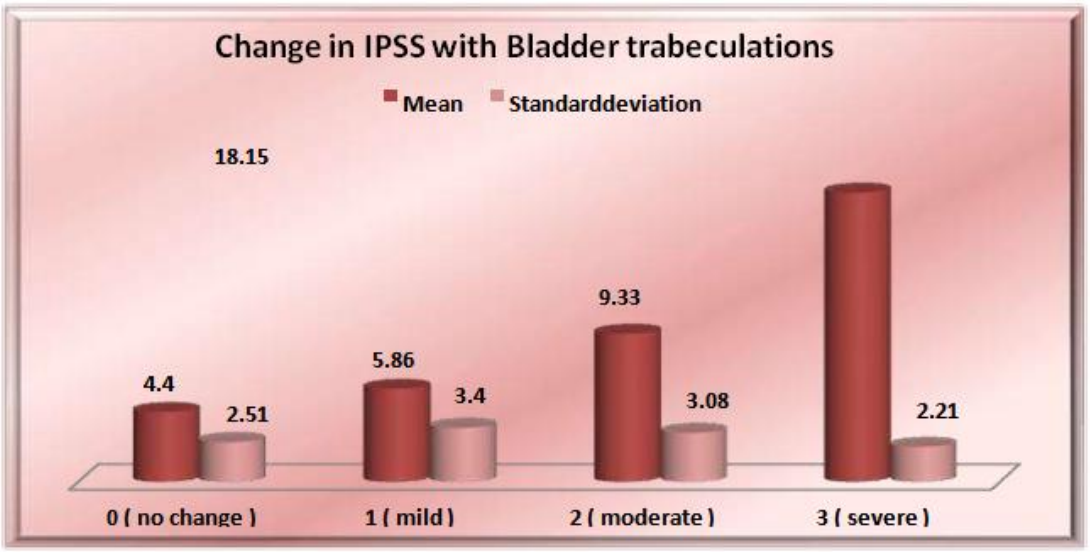
Graph 10: Mean change in IPSS with Preoperative IPSS

v)Change in IPSS with Bladdertrabeculations- Mean change in IPSS with Group 0 (No change) was 4.4±2.51, in Group 1 (Mild trabeculations) was 5.86±3.40, in Group 2 (Moderate trabeculations) was 9.33±3.08, Group 3(Severe trabeculations) was 18.15±2.21. Analysis showed that mean IPSS change to be more significant in group 3 as compared to rest three groups with p-value<0.005

Table no. : 10
Change in IPSS with Bladder trabeculations

Bladder trabeculations	Mean	Standard deviation
Group0 (No.change)	4.4	2.51
Group 1 (Mild trabeculations)	5.86	3.40
Group 2 (Moderate trabeculations)	9.33	3.08
Group 3 (Severe trabeculations)	18.15	2.21

1) There was statistically significant difference between severe group with no change group according to their bladder trabeculations, with $p < 0.05$ ($p < 0.0001$)
2) There was statistically significant difference between severe group with mild change group according to their bladder trabeculations, with $p < 0.05$ ($p < 0.0001$)
3) There was statistically significance difference between severe group with moderate change group according to their bladder trabeculations, with $p < 0.05$ ($p < 0.0001$)



Graph 11: Mean change in IPSS with Bladder trabeculations

In our study as we observed significant changes in IPSS in definite obstruction group 1 (≤ 7 ml s^{-1}), sever pre-operative IPSS group (group 3 i.e. IPSS 20-35) and grade 3 trabeculations. Thus we further analyzed the effect of the evaluated parameters on the various components of the IPSS, with the purpose of analyzing which particular components showed the maximum improvement and which components did not show marked improvement. This can act as guide for preoperative counselling and further evaluation of patients regarding for which particular symptoms they can expect maximum benefit.

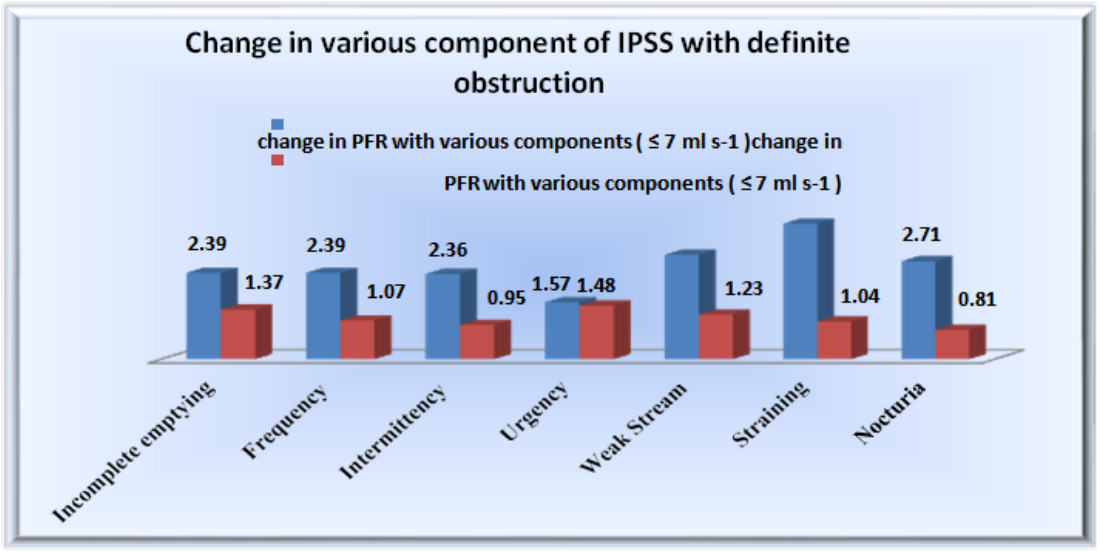
- **The mean change in the various components of IPSS in patients with definite obstruction (group 1 PFR ≤ 7 mls^{-1}):**

From the analysis in our study there was maximum improvement seen in weak stream, and straining (IPSSo). Minimum improvement in urgency (IPSSi).

Table no. : 11

Parameters	The mean change± SDin the various componentof IPSS with definite obstruction (group 1 PFR ≤ 7 ml s^{-1})	
	Mean	Standard deviation
Incomplete emptying	2.39	1.37
Frequency	2.39	1.07
Intermittency	2.36	0.95
Urgency	1.57	1.48
Weak Stream	2.89	1.23
Straining	3.75	1.04
Nocturia	2.71	0.81

The mean change in the various component of IPSS with definite obstruction group 1 (n = 28) PFR ≤ 7 ml s^{-1}



Graph 12: Mean change in various component of post op IPSS with PFR ≤ 7ml/s

- The mean change in the various components of IPSS in patients with Severe pre-operative IPSS (group 3 pre-op IPSS20-35):

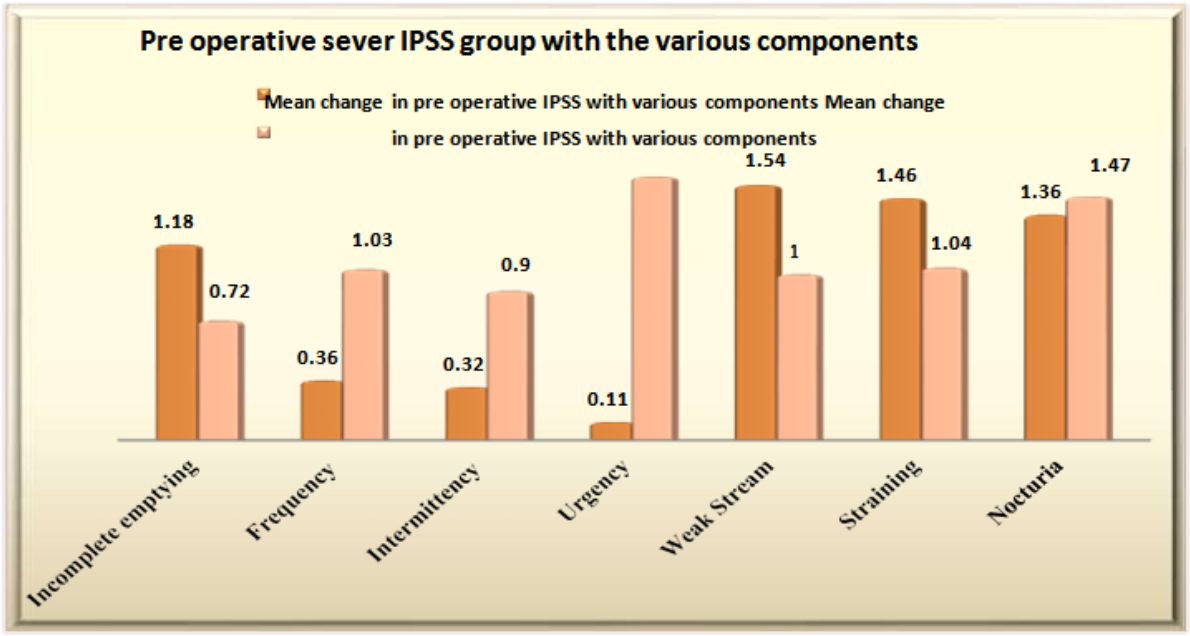
Sever IPSS group there was maximum improvement observed in weak stream, straining, and nocturia (more in IPSSo). Minimum improvement was seen in urgency, intermittency, frequency (IPSSi).

Table no. : 12

Parameters	The mean change ± SD in the various component of IPSS with Pre -operative sever IPSS (group 3 pre-op IPSS 20-35)	
	Mean	Standard deviation
Incomplete emptying	1.18	0.72

Frequency	0.36	1.03
Intermittency	0.32	0.90
Urgency	0.11	1.59
Weak Stream	1.54	1
Straining	1.46	1.04
Nocturia	1.36	1.47

The mean change in the various component of IPSS with Pre-operative sever IPSS (group 3 pre-op IPSS)



Graph 13: mean change in the various component of IPSS with Pre-operative sever IPSS

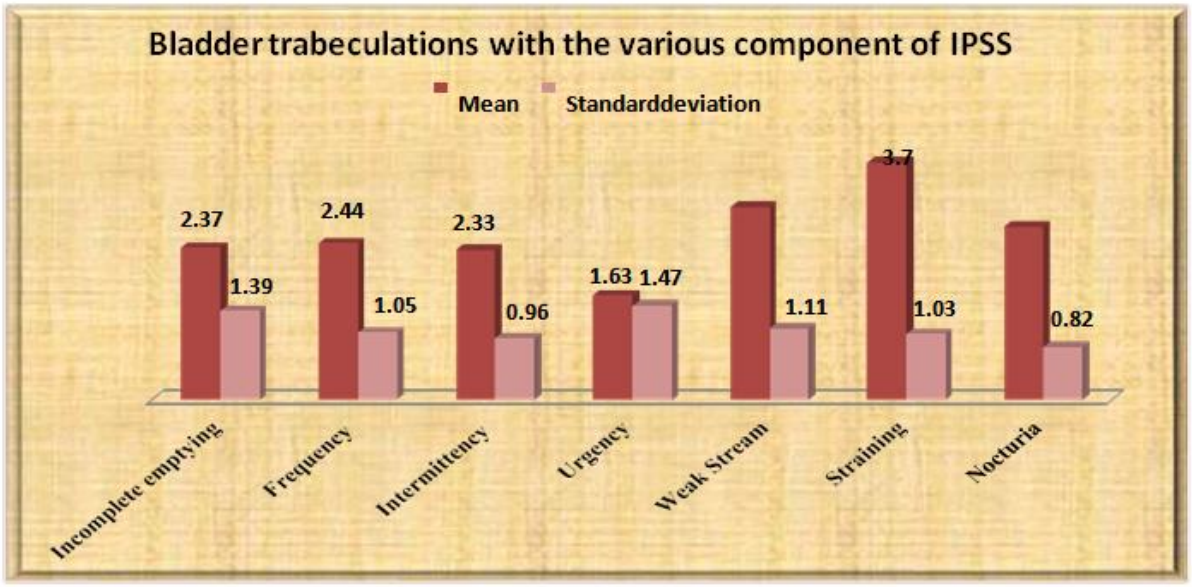
- The mean change in the various components of IPSS with grade 3 Bladder trabeculations (group3):

In grade 3 bladder trabeculations group there was maximum improvement in straining, weak stream (IPSSo components) and minimum improvement in urgency (IPSSi component)

Table no.:13

Parameters	The mean change ±SDin the various component ofIPSS with grade 3 bladder trabeculations (group 3)	
	Mean	**Standard deviation**
Incomplete emptying	2.37	1.39
Frequency	2.44	1.05
Intermittency	2.33	0.96
Urgency	1.63	1.47
Weak Stream	3	1.11
Straining	3.70	1.03
Nocturia	2.70	0.82

The mean change in the various components of IPSS with grade 3 Bladder trabeculations (group 3).



Graph 14: Mean Change in various component of IPSS with severe Bladder trabeculations

Summarized results-Mean age of 60 patients was 64.17±6.5yrs (range 55-80) Mean prostate size was 54.61±15.84

Pre-operative summarized data:-

Mean IPSS was 18.73±6.31

Mean peak flow rate was 7.88±15.84 Mean quality of life was 4.5±1.5

Post-operative summarized data :- (At the end of 3rd month) Mean IPSS was 7.11±1.5

Mean peak flow rate was 18.5±3.8 Mean quality of life was 1.53±0.59

From above data in our study the overall improvement as measured by decrease in mean IPSS from 18.73±6.31 before surgery to 7.11±1.5 at the end of three months and increase in PFR (Qmax) from 7.88±15.84 to 18.5±3.8 These overall results are comparable to study by Wadie BS, *et al.*, 24 patients showed a decrease in mean AUA symptom score from 20.5 before surgery to 1.12 at 24 months and an increase in Qmax from 8.7 to 21.8ml/s.[18]

IV. Discussion

The management of Benign Prostatic Hyperplasia has evolved remarkably over the last two decades with newer and more potent additions to the pharmacological arsenal, as well as introduction of many new minimally invasive therapies which enable the patient to go home within a day. Changing trends in energy sources along with minimal complications associated with minimal invasive techniques have increasingly made surgical intervention the definitive modality of treatment for symptomatic BPH. TURP is the most commonly performed surgery in older men with symptomatic BPH with obstructed flow.

With the development of terminology and symptoms classification that allowed us to standardize the symptoms and investigations, it has become much easier to understand the effects of treatment on the outcome.

Although it was always accepted that TURP is the method associated with best results, with the advent of standardized symptom scores many patients need not go for surgical intervention. On the other hand with TURP there is variability of improvement in symptom scores observed with individual patients[‟].

There have been several studies conducted to identify the relationship between different individual factors based on pre-operative findings and outcome. However, studies based on multiple factors likeage, degree of obstruction, prostate size, pre-operative IPSS, bladder changes are less. Thus, the need for present study arises.

This study was conducted to assess the role of various factors affecting the outcome of surgery in patients undergoing TURP for BEP by using IPSS. The factors of interest for this study were age, peak flow rate, prostate size, pre-operative IPSS, bladder trabeculation changes.

1) **Age**- In present study there were 31.67% in group one (≤60yrs) and 68.33% in group two (>60yrs) were studied. The mean change in IPSS in group 1(≤ 60 year) was 11.53and in group 2(>60 year) was 11.66. Statistical analysis showed t-value of 0.0698 and p-value of 0.9446. Thus there was no significant difference in the mean change in IPSS with age. Hence, in our study the age of the patients did not affect the outcome ofsurgery.

In a similar study conducted by Wang Qing-wei[20] et al., the mean change of IPSS was 17.81 in the younger group (68±4yrs) and 11.67 in elderly group (80±3yrs) after TURP. There was a significant change in IPSS within each of the groups after TURP, however when compared between the groups the change in IPSS after TURP is not significant (p>0.05). This has been attributed to the fact that risk of bladder-urethral dysfunction increases with ageing in the elderly withBEP. The difference in results between this study and the study by Wang Qing–Wei, et *al*., could be due to slightly higher mean age of the study participants in the latter.[20]

2.**Degree ofobstruction**: In Group 1 (≤ 7 ml s^{-1}) the change in IPSS was 18.036±2.25 while inGroup2(>7mls^{-1})itwas6±3.18.Onanalysist-valuewas1.96withp-value

<0.0001. Thus there was statistically significant difference between two groups according to their PFR with change in IPSS. So with definite obstruction (≤7 ml s^{-1}) the results were significantly better as compared to equivocal or unobstructed flow (>7 mls^{-1}).

As seen from table no.7 the change in IPSS was statistically significant within both the groups. However, in the definitive BOO group, the change in IPSS was higher, thereby resulting in better surgical outcomes. This finding is similar to other studies (by Mimi oh[15],Vanvenrooij[25]) where significant changes in IPSS was identified in the BOO group. In studies by Dong Suk Min[14] and O.W. HAKENBERG[10], though the improvement in IPSS was higher in obstructed group, it was not statistically significant. These studies also identified a weak correlation between preoperative degree of BOO and TURP outcomes. Hence, TURP is the recommended treatment modality in those who do not warrant medical treatment in patients with equivocal BOO after detailedinvestigations.

3. **Prostatesize**: The change in IPSS with prostate size in group 1 (≤ 60 cm^3) was 12.43±6.34 and in group 2 (>60 cm^3) was 10.30±7.09. Statistical analysis showed t-value of 1.96 and p-value of 0.2315. Within the groups, the change in IPSS after TURP was statistically significant. However, there was no significant difference in the mean change in IPSS between relatively smaller prostate group≤ 60 cm^3 or in the relatively larger prostate size group ≥ 60 cm^3. Thus, in our study the prostate size of the patient did not affect the outcome of surgery.

In Mi Mi Oh1[15] study with prostate volumes (51.70±22.78 vs. 48.60±22.63), the mean IPSS changes between the groups was not statistically significant with a p-value of 0.464. Similar results were observed in another study conducted by Oliver W. Hakenberg[21], Hyo Serk Lee[22].

Hyo Serk Lee[22] also noted that there is clinical significance of the different shapes of the prostate, as shown by TRUS (trans rectal ultrasonography) before and after transurethral resection of the prostate (TURP). Patients with a prostate protruding into the bladder have less improvement in their IPSS scores after TURP, compared to patients that do not have prostateprotrusion.

A weak association exists between prostate size and symptomatic improvement after TURP. Therefore, the symptomatic improvement after TURP may not be primarily dependent on the relative prostate volume or relative completeness of theresection.

4.**Pre-opIPSS**: In present study, patients' groups were classified according to pre-op IPSS. In group 1 (mild≤8) there were 4(6.66%), in group 2(moderate 9-19) there were 28(46.67%) and in group3 (severe 20-35) there were 28(46.67%) patients observed.

Mean change in IPSS with group 1 (mild≤8) of pre-operative IPSS was 1.25±0.96, in group 2 (moderate 9-19) was 14.57±3.11 and in group 3(severe 20-35) was 24.57±1.93. Analysis showed that the mean change in IPSS is statistically significant (p-value <0.005) in group 3 compared to the other two groups

The change in IPSS with Preoperative IPSS comparison with other study:

Table: 14

Preoperative IPSS	Mean change in IPSS	
	In our study	O.W. HAKENBERG[10]
group 1(mild:0-8)	1.25	-0.25
group2(moderate:9-9)	14.57	6.62
group 3(sever:20-35)	24.57	14.0

There is inadequate analysis and scarcity of literature regarding pre- op IPSS evaluation and how it affects the outcome in TURP for BEP patients.

Results of this study are comparable according to the study by

O.W. HAKENBERG[10]. When IPSS improvement across the groups were considered, mild (IPSS 0–8) subgroup gained no IPSS improvement and maximum improvement was seen in severe IPSS (20-35) subgroup, p < 0.005.

The initial IPSS correlated well with IPSS improvement, but not with IPSS after TURP. Initial IPSS was a better predictor of IPSS improvement. The IPSS can be considered a relevant tool for evaluating patients before treatment and it has been shown to be predictive of symptom improvement after TURP. Both the IPSS and pressure-flow assessment are useful tools to exclude patients who are unlikely to benefit from TURP.

5.Bladdertrabeculations: In this study, intra operative cystoscopic findings on bladder changes were graded according to established bladder trabeculation classification method[24]. There were 5 patients in group 0. (8.33%), 22 patients
in group 1 (36.67%), 6 patients in group 2 (10%) and 27 patients in group 3 (45%). Mean change in IPSS with Group 0 (No change) was 4.4±2.51, In Group 1 (Mild trabeculations) was 5.86±3.40, in Group 2 (Moderate trabeculations) was 9.33±3.08, in Group 3(Severe trabeculations) was 18.15±2.21. Statistical analysis showed from the mean IPSS change to be significant in group 3 as compared to rest three groups with p-value <0.005.
There is inadequate analysis and scarcity of literature regarding bladder trabeculation changes and how it affects the outcome in TURP for BEP patients
Results were comparable to the study by Cho, *et al.*, which concludes that grade 3 trabeculation had a significant change in IPSS (p=0.009) with significant differences in storage score, especially urgency score.[15]Confirming bladder trabeculation grade during TURP will be helpful to predict the improvement from voiding symptoms and medication planning after surgery.

V. Conclusion

- TURP in all patients resulted in improvement in IPSS, QOL and PFR. However, the results are observed with certain variability in terms of improvement in symptomscores.
- The improvement in IPSS is independent ofage.
- There is significant difference in mean IPSS change with degree of obstruction
- The prostate size did not affect the outcome ofTURP
- Initial IPSS correlated significantly with IPSSimprovement
- Simple non-invasive investigations like:

a) Uroflowmetry,
b) Pre-op IPSS.
Will give reliable predictions in terms of outcome of TURP

- Severe trabeculations group has significantly higher improvement in IPS
- Results are comparable with studies fromliterature.
- Further analysis for each component of IPSS showed there is higher improvement in obstructive symptoms such as straining, weak stream and less improvement in irritative symptoms afterTURP.

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