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Study of Correlation Between Clinical Severity of Symptoms by IPSS (International Prostate Symptom Score) with Ultrasound Findings and Prostate Specific Antigen

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ABSTRACT
The American Urological Association created the international prostate symptom score (IPSS) rating system to assess the intensity of lower urinary tract symptoms (LUTS) in BPH patients. Present study was aimed to study correlation between clinical severity of symptoms by IPSS (international prostate symptom score) with ultrasound findings and prostate specific antigen. Present study was single-center, prospective, observational study, conducted male patients with age more than 40 years, having Lower urinary tract symptoms. The study was conducted on an age group ranging from 41-92 years with a mean age of 63.4 years. The mean IPSS score was 16.1 (range 0-35) in this study. Serum PSA with a range of 0-4ng/ml was having a mean value of 3.2. The mean prostate volume on ultrasound was 47.2 with the pre-void residue of 315.7 and a post-void residue of 144.3. On basis of IPSS score, maximum, i.e. 60 % (72 patients) were having moderate symptoms. Followed by 37 patients (30.8%) were having severe symptoms while remaining 11 patients were having mild symptoms. In our study serum PSA ranged from 0.37-12.34ng/ml. 98 subjects (81.6%) had serum PSA less than 4ng/ml. While the remaining 22 subjects (18.33%) had serum PSA of more than 4ng/ml. There is a significant correlation between age and IPSS score. There is a moderate but statistically significant correlation between prostate sizes when compared to the IPSS score. There is a correlation between IPSS score and serum PSA level.

INTRODUCTION

Benign prostatic hyperplasia and Carcinoma of the prostate are increasingly frequent with advancing age and are uncommon before the age of 40 yrs. Prostatomegaly is common in men past fifth decade of life and has been the most common cause of symptoms associated with lower urinary tract obstruction[1,2]. In India the incidence of benign prostatic hyperplasia is estimated to be 92.97% and carcinoma of prostate is estimated at 8/100,000 persons[3].

The American Urological Association created the international prostate symptom score (IPSS) rating system[4]. This scoring system, which ranges from 0 to 35, takes into account seven questions about voiding and filling symptoms and accounts for mild, moderate and severe lower urinary symptoms. The IPSS has been frequently used in clinics to assess the intensity of lower urinary tract symptoms (LUTS) in BPH patients[5,6].

PSA is a protein which is found exclusively in prostatic tissue. Although, increased PSA levels have been found to be closely associated with prostate cancer, there can be different reasons for an elevated PSA level, including benign prostatic hyperplasia, prostatitis, prostatic trauma and prostatic infarction[7]. However, more recent studies have revealed that many men with higher PSA levels did not have prostate cancer and that some men with PSA levels below 4.0ng/ml may have the disease[3]. Present study was aimed to study correlation between clinical severity of symptoms by IPSS (international prostate symptom score) with ultrasound findings and prostate specific antigen

MATERIALS AND METHODS

Present study was single-center, prospective, observational study, conducted in department of surgery, at B K L Walawalkar Rural Medical College and Hospital, Sawarde, Taluka- Chiplun, District- Ratnagiri, Maharashtra, India. Study period was from December 2020 to July 2022. Study approval was obtained from institutional ethical committee.

Inclusion Criteria:
- Male patients with age more than 40 years, having Lower urinary tract symptoms, willing to participate in present study.

Exclusion Criteria:
- Previously operated cases of prostatic surgery.
- Diagnosed case of carcinoma prostate.

Study was explained to patients in local language and written consent was taken for participation and study. A clinical questionnaire including detailed History, examination, IPSS score was made. All patients who had the clinical symptoms of prostatism on digital rectal examination (DRE). Blood samples were collected and serum prostate specific antigen levels were evaluated.

The standard protocol diagnostic methods applied for prostatic lesions were digital rectal examination (DRE), Trans abdominal ultrasonography of prostate, determination of serum PSA and biopsy of prostate. Participants were subjected to undergo ultrasound abdomen and pelvis., prostate size, pre-void, post-void residue was noted. Similarly, serum PSA level was done in each and every participant and the values were recorded accordingly. All the collected data were entered into a spreadsheet on Microsoft office excel sheet, data validation checks were performed at regular intervals and later were transferred the o Statistical package for social sciences version 21.0 (SPSS, Inc., Chicago, IL, USA) for window. The quantitative variables are described in terms of mean, median, range and standard deviation., while qualitative variables are described in the form of proportion. A significant p-value was taken as $p<0.05$.

RESULTS AND DISCUSSIONS

This study was conducted on 120 patients with an age group ranging from 41-92 years. The clinical assessment was done to evaluate lower urinary tract symptoms using the international prostate symptom score. These patients were later subjected for laboratory analysis for prostate specific antigen and ultrasound examination to assess for prostate size, pre-void and post-void residue. The study was conducted on an age group ranging from 41-92 years with a mean age of 63.4 years. The mean IPSS score was 16.1 (range 0-35) in this study. Serum PSA with a range of 0-4ng/ml was having a mean value of 3.2. The mean prostate volume on ultrasound was 47.2 with the pre-void residue of 315.7 and a post-void residue of 144.3.

Table 1: Basic Characteristics

Parameters	Mean (SD)
Age (years)	63.4 (12.5)
IPSS score	16.1 (6.3)
Sr PSA	3.2 (2.2)
USG Prostate volume	47.2 (15.9)
USG Pre-void residue	315.7 (98.3)
USG post-void residue	144.3 (64.7)

DRE was performed on all patients in this study. Out of which 46.7% individuals had grade I prostatomegaly. Very few that is around 12.5% had grade III prostatomegaly and the remaining 40.8% had grade II prostatomegaly.

Table 2: Distribution on the Basis of DRE (Digital Rectal Examination).

Prostatomegaly on DRE	n	%
1	56	46.7
2	49	40.8
3	15	12.5

IPSS score is divided into mild, moderate and severe. Mild 0-7, Moderate -8-19 and Severe-more than 20. In our study maximum, i.e. 60% (72 patients) were having moderate symptoms. Followed by 37 patients (30.8%)

were having severe symptoms while remaining 11 patients were having mild symptoms.

Table 3: Distribution on the Basis of IPSS Score.

IPSS score groups	n	%
Mild (0-7)	11	9.2
Moderate (8-19)	72	60
Severe (> 20)	37	30.8

In our study group, 43 subjects (35.8) gave score of 2, followed by 29 subjects (24.2) gave score of 3. There were no Subjects who were unhappy with a score 5 in our study. 13 (10.8%) subjects were mostly dissatisfied with the symptoms.

Table 4: Distribution on Basis of Quality of Life.

Quality of life	n	%
0 - delighted	11	9.2
1-Pleased	24	20
2-Mostly satisfied	43	35.8
3-Mixed about equally satisfied and dissatisfied	29	24.2
4-Mostly dissatisfied	13	10.8
5-Unhappy	0	0

Serum PSA is considered to be normal if less than 4ng/ml. In our study serum PSA ranged from 0.37-12.34ng/ml. 98 subjects (81.6%) had serum PSA less than 4ng/ml. While the remaining 22 subjects (18.33%) had serum PSA of more than 4ng/ml.

Table 5: Distribution on the Basis of Serum PSA Level.

Serum PSA (ng/ml)	Frequency
<4	98
>4	22

When age was correlated with IPSS score statistically significant result was obtained in our study. For age less than 51 years, the mean IPSS score was 14.9. The mean IPSS score was highest (18.29) in subjects above 70 years of age. For age group 51-70 years the mean IPSS score was 15.15.

Table 6: Correlation of IPSS Score with Age.

Age group	Mean (SD)
<51 years	14.9 (6.2)
51-70 years	15.1 (6.4)
>70 years	18.2 (5.7)

When the IPSS score was calculated in our subjects and compared with prostate volume and serum PSA it showed that those with severe IPSS symptoms have larger prostate size and raised serum PSA levels. There was a significant correlation between the IPSS score and serum PSA levels. The significance was found statistically with p-value of 0.204.

Also in our study, it was found that there was no significant change in pre-void residue as the IPSS score increased. But there was a significant difference when compared with post-void residue. The p-value was statistically significant when compared with age (0.013), sr PSA (0.204), USG prostate size (0.386) and post-void residue (0.000). It was not significant when compared with pre-void residue (0.745).

Elevated serum PSA levels can result from benign illnesses such as acute urinary retention, acute prostatitis, prostatic ischemia, prostate infarction and benign prostatic hyperplasia. While the typical serum levels in men between the ages of 50 and 80 without prostatic disease ranges between 1.0 and 4.0ng/ml, the concentration regularly found in seminal fluid ranges from 0.5-5.0mg/ml. PSA has been found to be expressed ectopically in lower quantities in the tissues of cancerous breast tumours, healthy breast tissues, breast milk and adrenal and renal carcinoma. However, PSA is essentially an organ-specific marker rather than a cancer-specific marker. There are limitations to using PSA as a tumour marker because both benign and malignant prostate disorders are on the rise. The study was conducted on 120 patients excluding the patients who had previous prostatic surgery or those who were known cases of prostatic carcinoma. It was a prospective observational study with an attempt to correlate clinical symptoms of the lower urinary tract (LUTS) with the help of International prostate symptom score (IPSS), prostate volume by ultrasonography, and serum PSA.

The age group in this study was 41-92 years with the mean age of 63.4 years. The sixth and seventh decades constituted a maximum number of patients, it accounted 50%, followed by 31.7 % above the age of 70 years. Comparable to this study is a sizable study by Andersson[8] that included 39,928 patients between the ages of 45 and 79, with a mean age of 63.7 years. Our study's age distribution was similar to that of an Indian study by Ganpule[9] that examined the natural history of lower urinary tract symptoms in 2406 individuals who were older than 40 years old. Increased frequency of micturition was the commonest clinical presentation (35.1%), followed by Nocturia (28%). Only 2 patients presented with acute urinary retention. The Maximum number of patients had moderate symptoms (60%), followed by severe symptoms (30.8%) on the IPSS scoring system. The most common mode of presentation was increased frequency of micturition, nocturia and urgency. Increased frequency of micturition is the most frequent mode of presentation in patients under the age of 70, whereas nocturia is the most frequent mode in patients beyond the age of 70, according to Andersson[8] study with a larger number of patients. In individuals with a history of lower urinary tract symptoms, nocturia is the most prevalent clinical symptom, according to an Indian study by Ganpule[9]. 60% of patients had moderate symptoms i.e. 72 patients. Severe symptoms in 30.8% (37 patients), while 9.2% had mild symptoms.

Table 7: Correlation of Medians with IPSS Score

Parameter	Mild (0-7)n=11	Moderate (8-19) n=72	Severe (>20) n=37	P-value
Sr. PSA	2.58 (1.84-3.10)	2.81 (1.71-3.68)	3.40 (1.94-4.13)	0.204
USG prostate volume	38.0 (29.0-50.0)	45.0 (36.0-58.2)	42.0 (36.0-62.5)	0.386
USG pre-void residue	310.0 (230.0-402.0)	301 (252.7-371.0)	305 (250.0-413.0)	0.745
USG post-void residue	73.0 (52.0-106.0)	125.3 (83.2-169.7)	169.0 (154.5-240.0)	0.000*

Median (25th-75th percentile)
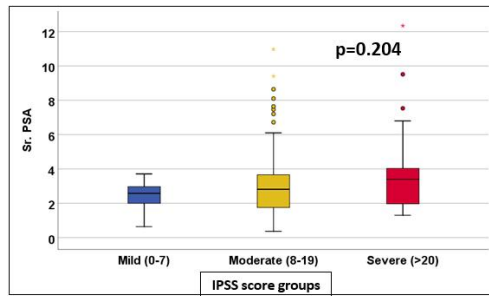
Graph 1: Correlation of IPSS Score with Serum PSA.
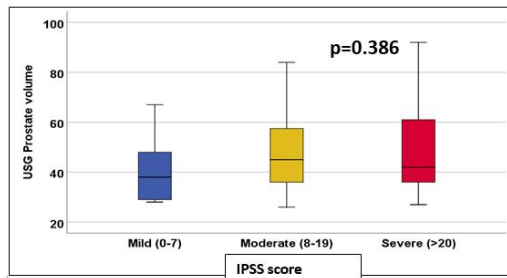
Graph 2: Correlation Between IPSS Score and Prostate Volume.
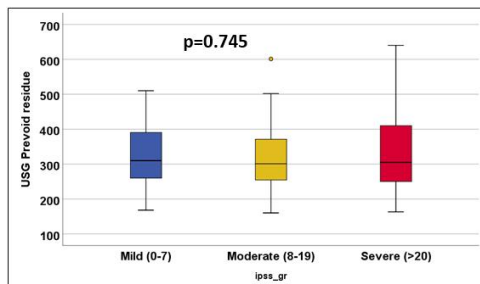
Graph 3: Correlation of IPSS Score with Pre-Void Residue.
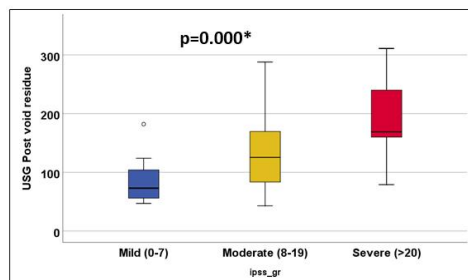
Graph 4: Correlation of IPSS Score with Post-Void Residue.

According to a study by Tay[10] on 799 patients, 67.6% had an IPSS of greater than 8. 90.9% of the patients in our study, however, had an IPSS of higher than 8. The tendency of delaying medical care and late presentations may be the reason why there were more patients in our study with severe symptom scores. In a study by Overland[11] it was shown that 23.6% of patients had moderate symptoms whereas 5% of patients had severe symptoms. Compared to this study, the IPSS severity is significantly higher in our study. Serum PSA values in our study ranged from 0.37 to 12.34ng/ml with a mean value of 3.2ng/ml. 81.6% (98 patients) had serum PSA less than 4ng/ml, while the remaining 18.33% (22 patients) had serum PSA more than 4ng/ml. In their study, Ercole[12] and Hudson[13] found that 21% of individuals with benign prostatic hyperplasia that had been histologically established had PSA values greater than 4ng/ml. In contrast to the studies by Ercole[12] and Hudson[13] 18.33% of the cases in our study had PSA values greater than 4ng/ml.

Trans abdominal ultrasound is more well-liked by patients than trans rectal ultrasound because it is non-invasive, simpler, easily repeatable and less intrusive. The prostate size, pre-void and post-void residue were evaluated with trans abdominal ultrasonography. In our study, the prostate volume ranged from 26-92 grams with 57.5% having a prostate size less than 50 grams, followed by 32.5% with a prostate size ranging from 50-70 grams. The remaining 10% had prostate size of more than 70 grams.

There is statistically significant correlation between IPSS score and age (0.013), serum PSA (0.204) and prostate size (0.386). There is a statistically higher significance between the IPSS score and post-void residue (0.000). There was no significance proved statistically between the IPSS score and pre-void residue (0.745). Scirra[14] noted that there was statistically significant correlation between IPSS score and age (p<0.005), similar findings were observed in present study. In study by Overland[10] and Scirra[14] there was statistically significant correlation between IPSS score and prostate size (p<0.005), similar findings were observed in present study. In study by Vesely[15] there was statistically significant correlation between IPSS score and serum PSA (p<0.005), similar findings were observed in present study.

CONCLUSION

There is a significant correlation between age and IPSS score. There is a moderate but statistically significant correlation between prostate sizes when compared to the IPSS score. Estimation of serum PSA also plays a crucial role in diagnosing the patient and for further

follow-up. There is a correlation between IPSS score and serum PSA level.

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