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A STUDY OF SERUM PROSTATE SPECIFIC ANTIGEN AND PROSTATE VOLUME IN BENIGN PROSTATIC HYPERPLASIA

Urology

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ABSTRACT

Background: Benign prostatic hyperplasia is one of the commonest causes of lower urinary tract symptoms in men older than 50 years of age. In this study, we have assessed serum Prostate Specific Antigen levels and prostate volumes in cases of benign prostatic hyperplasia as the age progresses. **Methods:** This was a hospital based prospective study conducted in the Department of Surgery Rabindra Nath Tagore Medical College attached to Maharana Bhupal Government Hospital, Udaipur over a period of 1 year. A sample of forty consenting inpatients with benign prostatic hyperplasia (BPH) presenting with lower urinary tract symptoms (LUTS) were included in the study based on inclusion and exclusion criteria. A thorough clinical examination was done of all the patients after taking a detailed history. Serum PSA and Transabdominal ultrasonography (TAUS) was done for all patients along with other routine investigations and imaging as necessary. Prostate volume and serum PSA was then tabulated. **Results:** Our study noted that most common age of presentation was between 61- 70 years followed by 71-80 years. In 30% cases PSA range was 0 to 2.00 ng/ml, in 10% cases it was more than 4.00 ng/ml. The maximum numbers of patients (60%) were in PSA range 2.1-4.00 ng/ml. In age group 51-60, 61-70 and 71-80 years the prostate volume is 28.0 to 72.0 to 55.0 and 27.8 to 1.10 cm3 respectively. **Conclusions:** In our study, we have found that with increasing age there is a significant increase in prostate volume and serum PSA. The rate increase in serum PSA is almost twice that of prostate volume with advancing years in patients with BPH.

KEYWORDS

Prostate, serum PSA, transabdominal ultrasonography, BPH

INTRODUCTION

Benign prostatic hyperplasia is one of the commonest causes of lower urinary tract symptoms in men older than 50 years of age. Hyperplastic growth of prostate begins in many men by the fifth decade of life. The percentage men with pathologically identifiable benign prostatic hyperplasia (BPH) at autopsy increases every year after the forth decade, 50 percent have pathologic BPH when they are 51 to 60 year old, and 90 percent have BPH by the ninth decade.

The growth & functions of prostate are fairly under the control of several hormones of which testosterone is most important. Size of the prostate gland on rectal examination does not necessarily mean a mathematical relation to the amount of obstruction produced and it is the luminal enlargement which is responsible for obstruction and can be best assessed by pan endoscopy. BPH requires long term treatment, the main stay of first line treatment for which has become pharmacotherapy. Prostatic volume (PV) is a significant predictive factor for progression of BPH and the response to 5α-reductase inhibitors).

According to epidemiological studies and those on medical treatment of BPH. Prostate volume is closely related to the aggravation of symptoms, development of acute urinary retention and increasing incidence of BPH related surgery. In addition, the larger the prostatic volume, the greater risk that pharmacotherapy will fail.

The serum prostatic-specific antigen (PSA) level and prostatic volume (PV) of patients with patients with BPH has a log -linear relationship that increases proportionately with age.[1]

Estimation of prostatic volume (PV) in patients with BPH can be done with trans-abdominal-ultra-sonography of prostate. Trans-abdominal ultrasonic scanning for size determination of the prostate has shown fair accuracy using the formula $\pi/6 \times (h \times l \times w)$.

METHODS:

This prospective study was conducted in the department of surgery Rabindra Nath Tagore Medical College and M.B Hospital, Udaipur. Forty cases of benign prostatic hyperplasia (BPH) with the chief complaints of lower urinary tract symptoms (LUTS) aged 50-80 years were studied.

Patients were evaluated by taking detailed clinical history, with special reference to the age of patient and duration of symptoms, particularly related to lower urinary tract , physical and local examination was done as per performa.

Inclusion Criteria

1. Age between 50 and 80 years.
2. Ambulatory Patient
3. Able to communicate verbally

Exclusion Criteria

1. Patients with serum PSA level of > 10 ng/ml to reduce the likelihood of including those with occult prostate cancer (variable).
2. A FNAC was taken in patients with a PSA level of >4ng/ml or finding suspicious of prostate cancer on a digital rectal examination and those with prostate cancer were excluded from the study.
3. Patients with UTI, acute prostatitis and those who had previously been taking a 5-α reductase inhibitor.
4. Patients with nodular prostate on DRE (PR Examination)

Following a detailed history patients were completely evaluated clinically.

- Digital rectal examination (DRE) of each patient was done to evaluate the size of prostate, consistency, nodularity, mucosa, median groove and lateral sulcus.
- Patient were evaluated for associated pathology along with BPH so as to exclude them as cause of LUTS.

Routine Investigations:

1. Haemogram: Hb, TLC, DLC, ESR, BT, CT
2. Urine Analysis : Albumin, sugar and microscopic
3. Blood Sugar (Fasting + Post Prandial)
4. Blood Urea
5. Serum Creatinine
6. X-ray Chest and KUB region
7. ECG

Special Investigations

- CT Scan/MRI if needed
- Cystourethroscopy
- Total PSA (Prostate Specific Antigen) estimation by immunoassay method.
- Transabdominal ultrasonography of prostate for measurement of prostatic volume.
- The prostate volume is calculated (in cm^3) by substituting the formula for an ellipsoid, i.e. $\pi/6 \times$ (h x I x w), with the height, length and width of the prostate in cms measured by trans-abdominal sonography.

RESULTS:

Most of the cases were between 61-70 years age group followed by 71-80 and 51-60 years respectively. Socio-economic status of BPH patients was found with distribution as 40% of cases were of poor and 60% were of medium socio-economic status. Out of 40 cases 32.5% belonged to urban and 67.5% belonged to rural place.

All the cases of BPH had complaint of sensation of incomplete emptying of bladder. Weak urinary stream and burning micturition were present in 92% of cases. These symptoms were followed by frequency, urgency, nocturia, dysuria and retention of urine in 92.50% cases, intermittency, hesitancy (95%) cases and haematuria in 20% of cases.

The prostate was found to be firm in all cases of BPH. Prostate was moderately enlarged in 52.50%, mild in 32.5% and markedly enlarged in 15% cases. There was no nodularity. Mucosa was free in all cases (100%). Median groove obliterated in 7.5% and not obliterated in 10.00% cases. Lateral sulcus not obliterated in all cases.

Cystourethroscopy was done in 37 cases. BPH gr I, gr II, gr III found in 15%, 65%, 7.5% respectively. Bladder neck open in one cases2.5%. Bladder tumour was also found in one case 2.5%. In 1 case grading could not be possible due to haemorrhage.

Table 1

Finding	No. of Patients	Percentage
BPH gr I	6	15.00
BPH gr II	26	65.00
BPH gr III	3	7.50
Bladder neck open	1	2.50
Enlarged Prostate	1	2.50

In age group 51-60, 61-70 and 71-80 years the PSA range is 0.002 to 3.88, 0.138 to 5.0 and 1.83 to 3.91 ng/ml respectively.

Table 2

Age (years)	PSA Range (ng/ml)
51-60	0.002 – 3.88
61-70	0.138 – 5.0
71-80	1.83 – 3.91

Table 3

PSA Range	No. Of Patients	Percentage
0 -2.00	12	30.00
2.1 – 4.00	24	60.00
>4.00	4	10.00
Total	40	100.00

In 30% cases PSA range was 0 to 2.00 ng/ml, in 10% cases it was more than 4.00 ng/ml. The maximum numbers of patients (60%) were in PSA range 2.1-4.00 ng/ml.

In age group 51-60, 61-70 and 71-80 years the prostate volume is 28.0 to 72.0 to 55.0 and 27.8 to 1.10 cm^3 respectively.

Table 4

Age (years)	Mean prostate volume(cm3)	Mean PSA (ng/ml)
51-60	45.70	2.09
61- 70	51.90	2.69
71-80	58.30	3.01
Overall	51.97	2.60

As noted, with increase in age there was an increase in serum PSA and prostate volume. The increase in prostate volume was not as steep and increase in serum PSA with increasing age. The increase in serum PSA was almost twice that of increase in prostate volume.

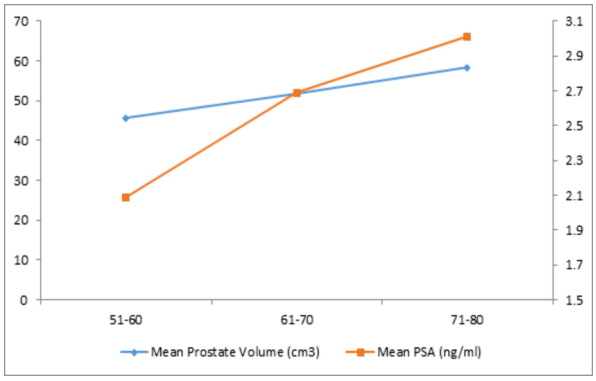

Figure 1

DISCUSSION

In present study of 40 cases of BPH most of the cases were in the age group 61-70 years i.e. 37.50%% followed by 71-80 years (32.50%) and 30% in age group 51-60 years Average age of BPH in present series was 62.45 year.

In our study most of the BPH patients belong to medium socio-economic status (60.00%) and rest of the cases belong to poor socio-economic status (40.00%). Aranki et al. (1983) found higher rates of BPH in higher income groups. In contrast, Glynn et al. (1985) reported higher rate of surgery in lower socio-economic group. Higher income group have better access to health care and lower income groups might submit more readily to the suggestion of a surgical procedure.

This study showed that the retention of urine was present in 92.5% cases. These cases either presented with retention of urine of acute variety (< 1 month) in 80% cases with catheterization at peripheral hospitals.

esnick et al. (1978) found that rectal palpation is single most important step in physical examination for detecting carcinoma of prostate and it is well recognized that there is an increased incidence of early disease detection when done routinely. Miller and Garvie (1973)[2] also found that the rectal examination is a reliable means for detecting the size of prostate gland if the gland is small or slightly enlarged but with larger glands considerable error may occur.

In our study all cases had consistency of prostate to be firm and 32.5% cases had mild size of prostate and 52.5% cases were of moderate size and rest 15.0% had markedly enlarged prostate on digital rectal examination. We observed that the mean size of prostate observed by per rectal examination was mild, moderate and marked and these findings proportionately correlated with the size estimated by ultra-sonography.

Cystourethroscopy was done in 37 cases. 15% cases were found to have grade I, 65% of grade ll and 7.5% cases had grade III enlargement. In one case, grading could not be possible due to haemorrhage and bladder neck was open in one case.

Cystourethroscopy grading of enlarged prostate -

- Grade I (lateral lobe enlarged but not meeting)
- Grade II (lateral lobes kissing each other)
- Grade III (enlarged up to 3-4 cm in length)
- Grade IV (enlarged > 4cm in length)

The older the man, the greater the prostatic volume (PV) and the growth rate of PV increases as the PSA level increases. Therefore, PSA is a reliable predictor of the response to 5-α reductase inhibitors and progression of BPH (Jacobsen et al 1997)[3] In our study we have measured prostate volume by trans abdominal ultrasonography. 30% cases had prostatic volume 31-40 cc, 7.5% had PV < 30 cc, 15.0% had PV 41-50 cc, 37.5% cases were of PV 51-70 cc and only 15.0% cases had PV >70 cc. In age group of 51-60 years, PSA range was 0.002 to 3.88 ng/ml. In 61-70 years PSA was 0.138-5.0 ng/ml and in age group 71-80 years, PSA range was 1.83- 3.91 ng/ml. Byung et al., (2005)[4] also found age dependent increase in PSA and PV. They also found the rate of increase for PSA was higher than PV i.e. 35.9% and 12.4% respectively. As compared to our study, the rate of increase in PSA was almost twice in relation to increase in PV.

CONCLUSION

This study of 40 patients was undertaken in MB Hospital and RNT Medical College. Udaipur who were admitted in the department of surgery with BPH presented with complaint of LUTS (lower urinary tract symptoms). Majority of patients were from rural area and mostly belonged to medium and poor socio-economic status. Most of the patients were having complaint of retention of urine of recent onset (< I months). Majority of patients (52.50%) had moderately enlarged prostate and all patients had firm consistency and non nodular on DRE. On cystourethroscopy, most of the patients (>65%) had grade ll variety of enlarged prostate.

In all patients, serum PSA estimation was done. Majority of patients (70%) had PSA level between 2.1- 4.0 ng/ml. Only 10% cases had PSA level >4.0 ng/ml. Biopsy was taken in patients whoever had PSA level >4.0 ng/ml but all these cases proved histopathologically as benign prostatic hyperplasia (BPH). Prostate volume (PV) measured by prostatic size estimation by trans abdominal ultrasonography PV (in cm) 6 x Length x width x height of prostate in cm. Majority of patients (92.50%) had PV>30 cm^3. With advancing age serum PSA level and PV had increased in each decade of age group. The rate of increase each decade being higher for PSA than PV , 20.6% and 13.1% respectively.

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