Lower Urinary Tract Symptoms, Serum PSA, Digital Rectal Examination and Prostate Volume in Patients Presenting to Urology Department: A Cross-Sectional Study

Akash Raya[1], Pashupati Bhatta[1], Sanjay Sah[2], Vibina Aryal[3]

Author(s) affiliation

[1]Department of Surgery, National Medical College, Birgunj, Nepal

[2]Department of Biochemistry, National Medical College, Birgunj, Nepal

[3]Department of Physiology, National Medical College, Birgunj, Nepal

Corresponding author

Akash Raya, MBBS, MS
akashraya@gmail.com

ABSTRACT

Introduction

Lower urinary tract symptoms (LUTS) are common presentation in the urology department in males after 50 years. Enlarged prostate can be evaluated by digital rectal examination (DRE) and ultrasound. Serum prostate-specific antigen (PSA) has been suggested as a reliable tool to estimate prostate volume (PV) and to predict the diagnosis of prostate cancer. The aim of this study is to correlate prostate-specific antigen with clinical data like age and international prostate severity score (IPSS), DRE finding and PV among subjects with LUTS.

Methods

Total of 175 cases were included in the cross-sectional study who presented with LUTS in the Urology Department. DRE was done and noted. Then the cases were advised for ultrasonography (USG) and serum PSA level was sent for investigation. According to the history given by the cases IPSS was done using the IPSS scoring questions. The result was obtained by grouping the cases according to the level of serum PSA.

Results

The mean age of the total 191 cases was 72.23±10.46 years and mean PSA level in our study population was 9.08±23.69 ng/ml. Grade III PV was seen among 47.1% of the study population. IPSS scoring between 8-19 was seen among 68.1% study population. Correlation between serum PSA and age group (p=0.007) was significant. High significance (p<0.001) was seen in correlation between serum PSA and DRE finding, IPSS and PV.

Conclusion

Our study showed that serum PSA level plays an important role in the evaluation of prostate enlargement. The level of serum PSA along with presenting symptoms and clinical findings can help us to plan our mode of treatment accordingly.

INTRODUCTION

Diagnosis of benign prostatic hyperplasia (BPH) is done by the presence of benign prostate enlargement and lower urinary tract symptoms (LUTS). Prostate enlargement is examined in the urology out-patient department (OPD) by digital rectal examination and confirmed by ultrasound of abdomen and pelvis.[1] LUTS comprises of different symptoms like, urgency, urinary frequency, nocturia, decreased and intermittent force of stream and the sensation of incomplete bladder emptying.[2] Different studies have suggested that serum prostate-specific antigen (PSA) may be a reliable tool for estimating prostate volume (PV) in men with LUTS.[3,4]

PSA is a glycoprotein which is expressed by both normal and pathologic prostate tissue. Reports were published on several series where the need for a biopsy of the prostate was based on PSA tests, the PSA level was used as a screening tool.[5,6] Further studies led to believe that a PSA level of more than 4.0 ng per milliliter could predict the diagnosis of prostate cancer.[7] A PSA level of >2.5 ng/ml has a predictive value similar to that of 4.0 ng/ml or more according to recent data.[8,9]

The aim of this study was to correlate PSA with clinical data like age and International Prostate Severity Score (IPSS), DRE finding and prostate volume among subjects with symptoms of LUTS.

METHODS

A cross-sectional study was done at National Medical College, Department of Surgery, Urology Unit, Birgunj from May 2021 to March 2022. Total of 175 cases were included in the study who presented with symptoms of LUTS in the Urology OPD. Informed consent was obtained from the cases that were included in the study. Ethical clearance (FNMC/530/077-78) was obtained from institutional review committee of NMC Birgunj. Digital rectal examination was done in the OPD and was noted. Then the cases were advised for ultrasonography (USG) and serum PSA level was sent for investigation. Known case of BPH and patients under treatment for urinary symptoms and postoperative cases were excluded from the study.

The sample size was calculated using the formula:

$$N = K \frac{p_1(1-p_1)+p_2(1-p)}{(p_1-p_2)^2}$$

where,

N = sample size

p_1 = IPSS score with mild serum PSA level =0.564 [1]

p_2 = IPSS score with moderate serum PSA level =0.4154[1]

K value at a power of 80% and a level of significance of 95% was 7.9

Placing all the values in the formula the calculated sample size was 175. Total of 191 cases were included in the study. Thorough clinical history was taken form the cases. Symptoms of LUTS included urgency, urinary frequency, nocturia, decreased and intermittent force of stream and the sensation of incomplete bladder emptying were asked to the patients. According to the history given by the cases IPSS scoring was done using the IPSS scoring questions. The score comprises of eight questions that gives the information about incomplete urination, frequency of urination, intermittent force of stream, urgency, and nocturia. The result was obtained by grouping the cases according to the level of serum PSA.

Data collection was done in data collection sheet and later entered in Office Excel version 2016. Data analysis was done using Statistical Package for the Social Sciences (SPSS) version 16. Variables were expressed in mean ± standard deviation, frequency and percentage where applicable. Comparison between groups was done using Fisher Exact test where p value less than 0.05 was considered significant.

RESULTS

The mean age of the total 191 cases was 72.23±10.46 years. Maximum number of cases were in the age group of 71 to 80 years, the distribution is shown in Table 1. Table 2 shows the distribution of prostate volume where 47.1% had grade III prostate enlargement according to USG finding. Moderate LUTS was seen in 68.1% of

Table 1. Characteristics of study population

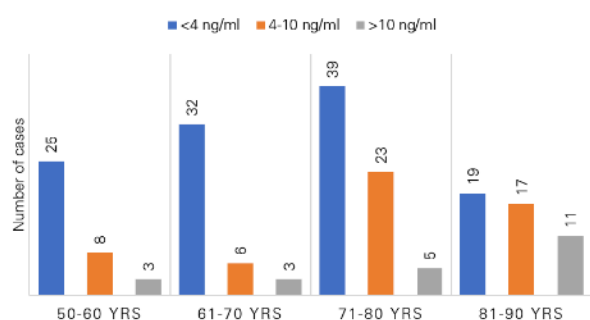| Characteristics	Number (%)
Age (years)	
50-60	36 (18.8)
61-70	41 (21.5)
71-80	67 (35.1)
81-90	47 (24.6)
Prostate volume (g)	
Grade I (≤ 25)	5 (2.6)
Grade II (26-50)	81 (42.4)
Grade III (51-75)	90 (47.1)
Grade IV (>75)	15 (7.9)
IPSS score	
1-7	16 (8.4)
8-19	130 (68.1)
20-35	45 (23.6)
Serum PSA level (ng/ml)	
<4	115 (60.2)
4-10	54 (28.3)
>10	22 (11.5)

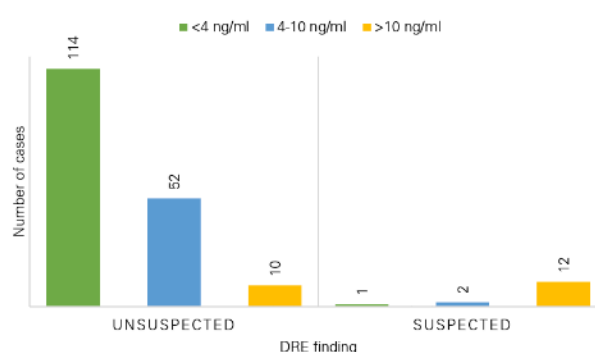*Figure 1. Distribution of serum PSA with age*

Figure 2. Distribution of serum PSA with DRE finding
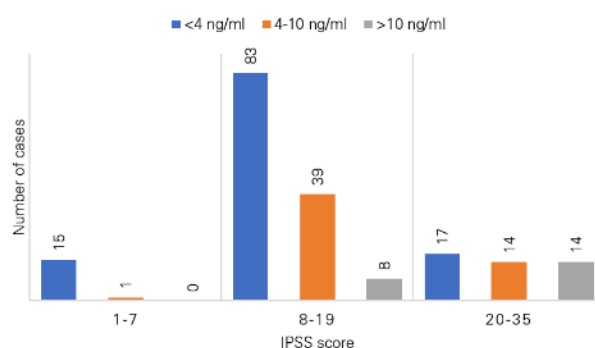

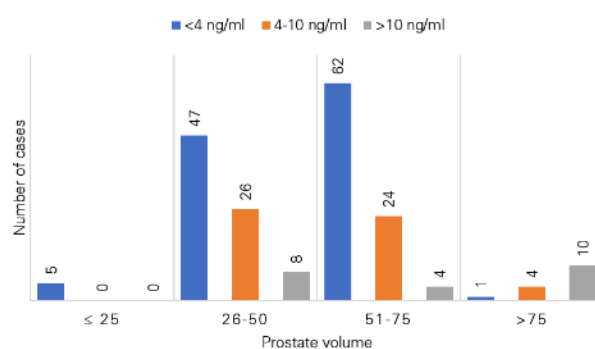*Figure 3. Distribution of serum PSA with IPSS score*

Figure 4. Distribution of serum PSA with prostate volume by USG

the cases where IPSS score was between 8 to 19 which is shown in Table 3. The mean PSA level in our study population was 9.08±23.69 ng/ml where 11.5% had serum PSA level higher than 10 ng/ml as shown in Table 4.

Maximum cases included in this study were in 71-80 age group where serum PSA of <4 ng/ml, 4-10 ng/ml and >10ng/ml was seen in 20.42%, 12.04%, and 2.61% cases respectively as shown in Figure 1. When correlated significant difference was seen between PSA and age group (p=0.007)

High significance was seen in correlation between serum PSA and DRE finding (p<0.001). Maximum cases included in this study had DRE finding not suspected of malignancy with serum PSA of >10ng/ml was seen in 5.24% cases and among the cases with suspected DRE finding for malignancy 80% cases had PSA of >10ng/ml as shown in figure 2.

High significance was seen in correlation between serum PSA and IPSS score (p<0.001). Maximum cases included in this study had moderate LUTS as shown by IPSS score where serum PSA of <4 ng/ml, 4-10 ng/ml and >10ng/ml was seen in 43.46%, 20.42%, and 4.19% cases respectively as shown in figure 3

High significance was seen in correlation between serum PSA and prostate volume in USG (p<0.001). Maximum cases included in this study had grade III prostate enlargement where serum PSA of >10ng/ml was 2.09% cases and among cases with grade IV prostate enlargement PSA of >10ng/ml was seen in 66.67% of cases as shown in figure 4.

DISCUSSION

The mean age of the total participant in our study was 72.23±10.46 years ranging from 50 to 90 years which was similar to other studies that corelated serum PSA with age, IPSS score, DRE findings and prostate volume.[1,10]

Our study showed significant correlation between PSA and age group (p=0.007). The number of cases with serum PSA level of >10 ng/ml was in increasing order in age group that is 8% in age group 50-60 and 23.4% in age group 81-90 which was statistically significant (p = 0.001). Our findings were similar to study done by Antony et al[1] and Richardson et al[11] among Asian population.

High significance (p≤0.001) was seen when serum PSA was correlated with DRE findings in our study. Among the cases, 6.28% cases with high serum PSA level of >10 ng/mg on examination were suspected for malignancy, whereas 5.24% with serum PSA of > 10 ng/ml but on rectal examination the prostate were unsuspected of malignancy. In the study done by Antony et al showed that total of 37 patient underwent biopsy who were suspected of malignancy either by DRE finding of raised PSA.

Among these cases 17.8% were diagnosed with adenocarcinoma.[1] As we did not include biopsy in our study we were not able to compare this findings but this shows that cases suspected of malignancy post rectal examination has to be sent for biopsy regardless of serum PSA.

In our study maximum cases (68.1%) presented with moderate symptoms of LUTS. When IPSS score was corelated with serum PSA high significance (p≤0.001) was seen between them. A rise in number of cases was seen from mild to severe LUTS symptoms. None of the cases had PSA level > 10ng/ml with mild LUTS where as with moderate and severe symptoms the number of cases increased to 4.19% and 7.33% respectively. Our result was in accordance with the study done by Antony et al.[1] Similarly study done by Park et al showed significant linear correlation of PSA with IPSS (p<0.001).[12]

In our study 47.1% cases had grade III prostate enlargement as shown by USG. The correlation between serum PSA and prostate volume showed high significance (p≤0.001). The result showed that serum PSA of >10ng/ml was highest in cases with grade IV prostate enlargement (5.24%) followed by grade II (4.19%) and grade III (2.09%) respectively. The cases with grade I (2.62%) had only PSA level of <4ng/ml. A significant correlation was observed between the prostate size and Serum PSA was shown by study done by Antony et al (p=0.05)[1] and Carvalhal GF et al (p=0.01).[13] In a study by Baruah et al a positive correlation was observed between prostate volume and serum PSA level (p=0.001).[14]

Our study only included cases presented to the OPD with symptoms, serum level and rectal examination. We did not include pathological findings in our study which would have given a definitive diagnosis to the presented cases. further study is required to compare the findings of our study with histopathological findings to be more accurate in diagnosing benign and malignant prostatic enlargement.

CONCLUSION

Our study showed that serum PSA level plays an important role in the evaluation of prostate enlargement. Based on the level of serum PSA we can send for biopsy to determine benign and malignant prostate lesion which can help us to plan our mode of treatment accordingly.

CONFLICT OF INTEREST

The author(s) declare that they do not have any conflict of interest with respect to the research, authorship, and/or publication of this article.

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