



Effect of different manipulations on serum PSA in patients with benign prostatic hyperplasia.

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ABSTRACT... Objectives: To evaluate the effect of different urological manipulations on the serum PSA level in patients with benign prostatic hyperplasia. **Study Design:** Quasi-experimental study. **Setting:** Department of Urology, Nawaz Sharif Social Security Hospital, Lahore. **Period:** January 2018 to December 2018. **Material & Methods:** A series of 60 patients were included in the study who fulfill the inclusion criteria. All the patients were above 50 years of age and presented with symptoms of benign prostatic hyperplasia. These patients were divided into four groups equally. In group A digital rectal examination, in group B transurethral resection of prostate, in group C Foley's catheterization and in group D Trans rectal ultrasound guided prostatic biopsy was done. Pre-manipulation and post-manipulation blood samples for serum PSA were taken after 30 minutes, 72 hours and one week. **Results:** Trans urethral resection of prostate, Foley's catheterization and trans rectal ultrasound guided prostatic biopsy caused a statistically significant rise in serum PSA level ($p < 0.05$) while digital rectal examination did not raise serum PSA level significantly. **Conclusion:** Different manipulations do cause alteration in the serum PSA level which may change the management plan.

Key words:

Benign Prostatic Hyperplasia, Carcinoma Prostate, Prostatic Specific Antigen, Prostatic Needle Biopsy, TURP.

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INTRODUCTION

Serum Prostate Specific Antigen (PSA) is not only helpful in diagnosis of patients with prostate cancer but also helps in staging and follow up. Although it is specific to prostate gland but not specific to cancer as it may rise in other benign conditions such as acute and chronic prostatitis, benign prostatic hyperplasia (BPH) etc.¹

Prostatic Carcinoma had a wide range of biological behavior between indolent and progressive. Early diagnosis of prostatic carcinoma increases the chances of early care of the disease.² Prostatic carcinoma is the most common cancer among elderly men with significant morbidity and mortality.³ In America the Prostatic carcinoma is the second leading cause of death after Carcinoma of lung.⁴ In Asian countries, the prevalence of Prostatic carcinoma is also increasing so now it is one of most common malignancy among elderly

men. It is 7% of all malignancies making it third most common cancer.⁵

Prostate specific antigen (PSA) is a proteolytic enzyme which helps in detection and follows up of Carcinoma of prostate. It is secreted and produced by the prostatic epithelial cells lining the acini and ducts. PSA also forms some part of ejaculate.⁶ It hydrolyzes the high molecular seminal proteins, fibronectin and seminogelin. This action causes liberation and liquefaction of the spermatozoa from the jelly like semen.⁷

PSA was identified in seminal plasma in 1971; later on it was isolated and purified. The gene which encodes the prostate specific antigen molecule is localized on chromosome 19.⁸ It is a single chain Glycoprotein with 237 amino acids and four side chains of carbohydrate.⁹ The molecular weight of PSA is 34 kilo dalton.¹⁰ Its level is estimated in

human serum.¹¹

The main objectives of this study were to determine the effect of digital rectal examination, transurethral resection of prostate, transurethral catheterization and trans rectal ultrasound guided prostatic needle biopsy on serum prostate specific antigen level in patients reporting with symptoms of benign prostate hyperplasia. The raised serum PSA level often give suspicion of prostatic carcinoma. Different manipulations can cause elevation of serum prostate giving false diagnosis of suspected prostate cancer and hence increasing the morbidity of patient by getting unrequired prostatic biopsies. Our study will help in saving the patients from unrequired prostatic biopsies and decreasing morbidities of patients with benign prostatic hyperplasia.

MATERIAL & METHODS

It is a quasi-experimental study which was conducted at the Department of Urology, Social Security Teaching Hospital, Lahore. The duration of study was one year from 1st January 2018 to 31st December 2018.

Post facto approval was obtained from ethical committee. A series of sixty patients were included in this study. All patients were above 50 years of age with lower urinary tract symptoms or presented with urinary retention. Patients with history of recent prostatic manipulation less than 4 weeks, known cases of neurogenic bladder, vesical stone, overactive bladder, Carcinoma of prostate and chronic prostatitis were excluded from study.

In demographic data the age of patients, their area of residence, education status and their socioeconomic status was recorded.

All sixty patients were divided into four groups randomly by balloting method. Each group consists of fifteen patients. After informed consent, detail history and physical examination was performed in all cases. Size of prostate was determined on ultrasound. Pre manipulation serum Prostate Specific Antigen level was determined in all patients.

In Group A, Digital rectal examination (DRE) was performed in all patients.

In Group B, All fifteen patients underwent transurethral resection of prostate.

In Group C, All fifteen patients underwent Foley's catheterization.

In Group D, Trans rectal ultrasound and needle biopsy was done in all patients.

Pre-manipulation and post-manipulation blood samples were taken after 30 minutes, 72 Hours and after one week, and sent to laboratory. All results were entered in a Performa and statistical analysis was done.

Statistical Analysis

Data was entered and analyzed by SPSS 22. Mean of numerical variables along with standard deviation was calculated. For comparison of Prostate Specific Antigen, ANOVA test for comparison of means was applied. Significant value was $P < 0.05$.

RESULTS

Total sixty patients were included in the study. The age range was from 52 years to 86 years (mean=64.02 years). Demographic data in all four groups showing area of residence and socioeconomic status was recorded (Table-I).

Group A

This group comprised of 15 patients in which digital rectal examination was done. Pre-manipulation (DRE) mean serum PSA was 1.22 ± 0.57 ng/ml. After 30 minutes of manipulation mean serum PSA level increased to 2.52 ± 0.64 ng/ml, after 72 hrs it was 1.56 ± 0.60 ng/ml and after one week of DRE mean serum PSA level dropped to 1.11 ± 0.42 ng/ml. Pre and post-manipulation mean serum PSA difference after 30 minutes was 1.30 ng/ml (Table-II). Pre and post-manipulation (DRE) serum PSA difference showed that there was statistically insignificant rise in serum PSA after 30 minutes of manipulation (P value > 0.05).

Group B

This group comprised of 15 patients who went under trans urethral resection of prostate (TURP). Prior to TUR-P mean serum PSA level was 3.41 ± 0.65 ng/ml. After 30 minutes of TUR-P mean

Serum PSA increased to 30.69 ± 6.28 ng/ml, after 72 hours and one week mean serum PSA was 8.22 ± 0.97 ng/ml & 4.25 ± 0.45 ng/ml respectively. Pre and post-manipulation (TUR-P) mean serum PSA difference after 30 minutes was 27.28 ng/ml (Table-III). The results showed that there was a statistically significant rise in mean serum PSA levels after 30 minutes of TUR-P (P value < 0.05).

Group C

This group comprised of 15 patients who were catheterized for acute urinary retention. Pre catheterization blood sample for serum PSA was taken in all these patients. Pre-catheterization mean serum PSA level was 2.85 ± 0.56 ng/ml, 30 minutes post-catheterization mean serum PSA level increased to 4.50 ± 0.80 ng/ml, after 72 hours mean serum PSA was 3.70 ± 0.63 ng/ml and after 1 week, dropped to 3.20 ± 0.57 ng/ml. Pre and post-manipulation mean serum PSA difference

after 30 minutes was 1.65 ng/ml (Table-IV). The results showed that there was a statistically significant rise in mean PSA levels after 30 minutes of Foley's catheterization (P value < 0.05).

Group D

This group comprised of 15 patients with suspicion of CA prostate on DRE. Pre-manipulation mean serum PSA was 2.48 ± 1.46 ng/ml; Post-manipulation (biopsy) mean serum PSA level after 30 minutes was 4.64 ± 2.38 ng/ml, after 72 hours 4.37 ± 2.09 ng/ml and After 1 week 2.65 ± 1.48 ng/ml (Figure-6). Pre and post-manipulation (biopsy) mean serum PSA difference after 30 minutes was 2.16 ng/ml (Table-V). The results showed that there was a statistically significant rise in mean PSA levels after 30 minutes of TRUS guided biopsy (P value < 0.05).

Group	AGE (Yeas)		Residence		Socioeconomic	
	Range	Mean	Local	Outside	Poor	Middle
A	52-70	58.86	4	11	13	2
B	56-83	69.23	3	12	14	1
C	55-78	63	5	10	13	2
D	57-79	65	2	13	12	3

Table-I. Demographic data of study participants (n=60).

Category	PSA level Mean \pm SD	Category	Mean \pm SD	Mean Difference
After DRE	1.22 ± 0.57	30 Minutes after Manipulation	2.52 ± 0.64	1.30
	1.22 ± 0.57	72 Hours after Manipulation	1.56 ± 0.60	0.34
	1.22 ± 0.57	One Week	1.11 ± 0.42	-0.11

Table-II. Comparison of means after applying Tukey test (Post HOC) Group A.

Post TURP	PSA level Mean \pm SD	30 Minutes after Manipulation	30.69 \pm 6.28	27.28
	3.41 ± 0.65	72 Hours after Manipulation	8.22 ± 0.97	4.81
	3.41 ± 0.65	One week after Manipulation	4.25 ± 0.45	0.84
	3.41 ± 0.65	Two week after Manipulation	3.78 ± 0.42	0.37

Table-III. Comparison of means after applying Tukey test (Post HOC) Group B.

Category	PSA level Mean \pm SD	Category	Mean \pm SD	Mean Difference
Foleys Catheter	2.85 ± 0.56	30 Minutes after Manipulation	4.50 ± 0.80	1.65
	2.85 ± 0.56	72 Hours after Manipulation	3.70 ± 0.63	0.85
	2.85 ± 0.56	One Week	3.20 ± 0.57	0.35

Table-IV. Comparison of means after applying Tukey test (Post HOC) Group C.

Category	PSA level Mean± SD	Category	Mean± SD	Mean Difference
Prostatic Biopsy	2.48±1.46	30 Minutes after Manipulation	4.64±2.38	2.16
	2.48±1.46	72 Hours after Manipulation	4.37±2.09	1.89
	2.48±1.46	One Week	2.65±1.48	0.17

Table-V. Comparison of means after applying Tukey test (Post HOC) Group D.

DISCUSSION

Serum Prostate Specific Antigen is most important and useful marker for the diagnosis of carcinoma of prostate, monitoring and predicting the prognosis of the disease. However the manipulation of the prostate gland by different procedures increases the level of serum Prostate Specific Antigen.^{12,13,14,15} These manipulations usually require to repeat the serum Prostate Specific Antigen level. So it is important to know which manipulation is affecting serum Prostate Specific Antigen level. In our study we calculated serum Prostate specific Antigen levels after Digital Rectal Examination, Transurethral Resection of Prostate gland, Foleys Catheterization and TRUS guided needle biopsy of prostate gland.

The Digital Rectal Examination is an important examination for the patients with suspicion of prostatic disease. Long et al¹² showed that serum Prostate specific Antigen was increased in 34 patients 20 minutes after digital rectal examination. Ornstein et al¹⁴ also demonstrated that digital rectal examination raised serum Prostate specific Antigen significantly. But, Lynn et al¹⁶ showed that the increase in serum Prostate specific Antigen after Digital Rectal Examination was not significant. Park SC et al¹⁷ also showed that there is no significant rise in serum Prostate specific Antigen level after Digital Rectal Examination. The results of our study is similar to this study that after digital rectal examination there is no significant rise in serum Prostate specific Antigen level after 30minutes, 72 hours and one week. The result of these studies show that the Digital Rectal Examination does not cause any disruption in the cellular architecture of prostate gland.

Transurethral Resection of Prostate gland is an acceptable and preferable surgical procedure for the management of benign prostatic hyperplasia.¹⁸ Most of the time surgeons resect

the adenoma at transitional and central zones of prostate gland, while the peripheral zone along with capsule remain intact. Although there are few studies available which follow the serum Prostate Specific Antigen level till one month, but, all studies stated that there is significant rise in serum Prostate Specific Antigen level after Transurethral Resection of Prostate.¹⁹ Our study also showed the same results. There is significant rise in serum Prostate Specific Antigen level after Transurethral Resection of Prostate. These results show that greater the interruption of cellular architecture of prostate gland, there is more rise in serum Prostate Specific Antigen level.

Urethral catheterization is a common procedure in the management of acute urinary retention. There are also patients of neurogenic bladder with permanent urethral catheter or patients with refractory retention who are waiting for surgery. In some studies it is demonstrated that there is no significant rise in the serum Prostate Specific Antigen level after catheterization.²⁰ While other studies showed that there is a significant rise in serum Prostate Specific Antigen level.²¹ Whereas our study showed that there is a significant rise in serum Prostate Specific Antigen level after catheterization. Although, theoretically, there is no disruption in the cellular architecture during urethral catheterization.

Trans rectal Ultrasound (TRUS) is a reliable tool for the evaluation of the volume of prostate gland and its architecture. It is also used for prostatic biopsy. Our study revealed that there is significant rise in prostate specific antigen after trans rectal ultrasound guided biopsy reason being it disrupts the cellular architecture of prostate gland. Similarly some other studies also suggested that TRUS-guided prostate biopsy increases the level of serum Prostate Specific Antigen significantly.^{12,17} This rise can occur in cases of prostatic

diseases (prostatic carcinoma, prostatitis) and manipulations of prostate gland.

In this study we also observed that rise in serum prostate specific antigen after different manipulations dropped back to base line after one week. Lynn et al¹⁶ and Lin et al²⁷ also observed in their studies that after four weeks of different manipulations serum prostate antigen level return to base line as was in pre manipulation samples.

CONCLUSION

It was concluded from our study that prostatic manipulation does cause a rise in serum prostate specific antigen. In view of these facts, it is therefore recommended that serum PSA level should be determined prior to any prostatic manipulation and one should wait for at least 2 weeks after prostatic manipulation to get an accurate result and to avoid any false positive rise in serum PSA.


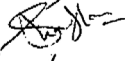



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3	Sohail Hassan	Acquisition of data.	
4	Manzoor Ahmad Naeem	Acquisition of data.	
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