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Original Research Paper

General Surgery

OBSERVATION OF PROSTATE SPECIFIC ANTIGEN LEVEL ON ENLARGED PROSTATE IN RIMS RANCHI.

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ABSTRACT

Aim and objective- To differentiate between physiological and pathological elevation of of PSA, importance of PSA level in various prostatic diseases, and monitoring the efficacy of therapy.

Patient And Method- study conducted in department of surgery, Rajendra institute of medical sciences, Ranchi. Study in 60 patients in OPD and in ward patient.

Result And Conclusion- There is physiological increase in serum PSA Level with increase in age in absence of any prostatic disease and symptom. Increase in PSA level in carcinoma prostate, monitoring of response of treatment and disease recurrence.

KEYWORDS :

INTRODUCTION:

Prostatic disease is one of the commonest conditions affecting the ageing males and comprise a bulk of cases admitted in the male surgical ward. Prostatic enlargement comprises mainly of benign hyperplasia of prostate and carcinoma of prostate, apart from other rare causes. Benign prostatic hyperplasia affects men over the age of 50 years and increases in frequency with age, so that by eighth decade more than 90% of men have histological prostatic hypertrophy at autopsy. Carcinoma of prostate is the commonest malignant tumour in men over the age of 65 years, and its incidence increasing day by day.

Prostate Specific Antigen (PSA)

Prostate specific antigen is an androgen-regulated serine protease produced by the prostate epithelium. PSA is normally present in low concentrations (< 4 ng/mL) in the blood of all adult males. Disruption of normal prostatic architecture allows greater amount of PSA to enter general circulation. PSA levels may be elevated in the blood of men with benign prostatic hyperplasia, prostatitis and prostate cancer.

Prostate intraepithelial neoplasia does not appear to raise serum PSA level. The serum PSA level rises only after disruption of prostatic epithelial basement membrane. Certain other condition which may cause rise in serum PSA level are- physical activity, infection, prostate biopsy, cystoscopy and Digital Rectal Examination (DRE), perineal trauma, prostate massage, prostate biopsy, transurethral resection and urinary retention.

PSA elevations may indicate presence of prostate disease, but not all men with prostate disease have elevated PSA levels. Furthermore, PSA elevations are not specific for cancer. The normal value of serum PSA level is less than 4 ng/ml. The serum PSA level of 4-10 ng/mL is considered borderline range, and the patient has 25% chance of having carcinoma prostate. The serum PSA level of 10-20 ng/mL is suggestive of prostate cancer and the patient has 50%-60% chance of having carcinoma prostate. The serum PSA level of > 35 ng/mL is almost diagnostic of advanced prostate cancer[1].

Serum PSA elevation is often the first sign of prostatic pathology. Both BPH and prostatic cancer can lead to an elevation of serum PSA however, the rate of rise of PSA associated with prostate cancer is usually higher than compared with BPH. A decrease of PSA to normal range following hormonal ablation is a good prognostic sign. Serum PSA level decreases and becomes undetectable after radical prostatectomy. A detectable serum PSA level following radical prostatectomy is associated with eventual disease recurrence.

Role of free PSA

It has been shown that men with prostate cancer have a greater fraction of serum PSA that is complexed to protease inhibitors (lower percentage of total PSA that is free) than men without prostate cancer. Free PSA levels vary directly with age and prostate volume and indirectly with total PSA level. Free / total PSA cut off of 0.18 (18% free / total PSA) significantly improve the ability to distinguish between cancer and non-cancer subjects as compared with use of total PSA alone. Percentage of free PSA appears to be most useful in distinguishing between those with and without prostate cancer when total PSA levels falls in the range 4-10 ng/ml. The percentage of free PSA has also been evaluated for prostate cancer diagnosis among men with PSA values below 4.0 ng/ml.

AIMS AND OBJECTIVES

1.To differentiate physiological elevation of PSA from pathological rise of PSA.
2. To evaluate the importance of PSA levels in cases of various prostatic diseases, like - benign prostatic hyperplasia, carcinoma of prostate, prostatitis and others.
3. To study the role of PSA in differentiating malignant from benign enlargement of prostate.
4. For monitoring the efficacy of therapy.

MATERIAL AND METHODS:

The present study was conducted in Department of Surgery and Department of Pathology, Rajendra Institute of Medical Sciences, Ranchi during the study period July 2018 to September 2020.

The material for the present study consisted of 60 cases of prostate enlargement, who attended surgical outdoor clinic and surgical emergency and admitted in different wards of the Department of Surgery, Rajendra Institute of Medical Sciences, Ranchi.

The criteria for selection of cases were the presence of clinical features related to prostate enlargement and age beyond 50 years. 10 cases (control cases) have been selected from healthy individuals (Medical and Paramedical staff as well as attendants of the patients) who had no clinical feature of prostate enlargement.

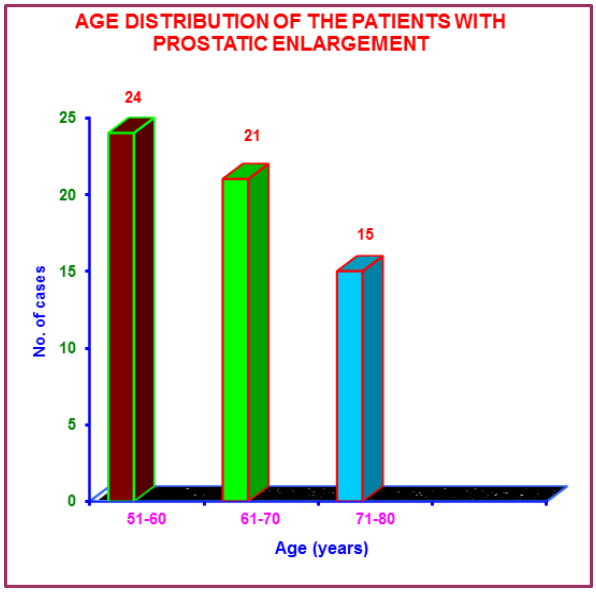
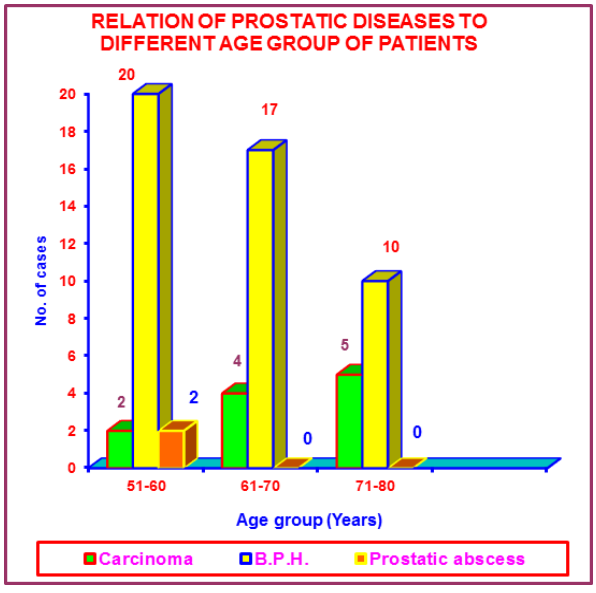


FIG- 1



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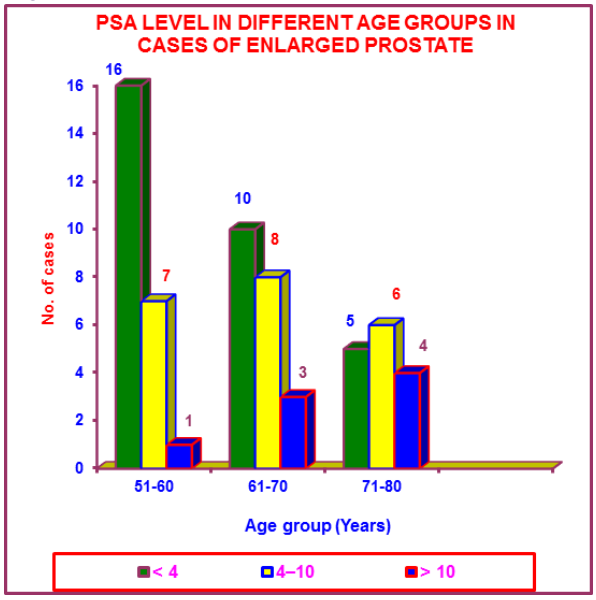

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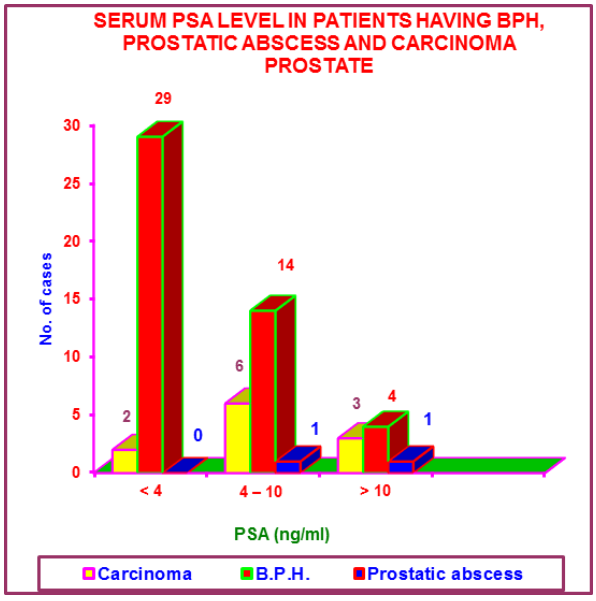

FIG- 4

RESULTS

1. In the present study, 60 cases of prostatic enlargement were studied of which 20 cases had carcinoma prostate, 38 cases had B.P.H. and 2 cases had prostatic abscess.

2. All the patients included in this study were examined by digital rectal examination, transabdominal ultrasound of prostate and serum P.S.A. estimation. As per findings in these and requirement, further evaluation was done with transrectal ultrasound and transrectal biopsy of prostate in selected cases.

3.In the patients, who were found to be cases of BPH after clinical examination, serum P.S.A. and transabdominal ultrasound, suprapubic trans vesical prostatectomy was done. In the cases with suspicion about their possibility of being malignant, prostatectomy was done after ruling out any such possibility by transrectal ultrasound and transrectal prostatic biopsy.

4. Most of patients had presented with symptoms of prostatism i.e. frequency, urgency, nocturia and poor-stream.

5. Eleven patients presented with retention of urine and two patients had symptom of bone-pain.

6. The percentage of BPH cases in the age groups of 51-60, 61-70 and 71-80 were found to be 91.66%, 85% and 66.66% respectively of the total number of patients. The prostatic abscess cases were more common in age group 51-60 years. The percentage of carcinoma of prostate was found to be increasing with age. Total percentage of cancer prostate cases in the age groups of 51-60, 61-70 and 71-80 were found to be 8.3%, 20% and 33.33% respectively (Fig -1).

7. Most of the patients in the present study belonged to rural areas and is can be attributed to the fact that most of patients attending the institution are residents of surrounding rural areas.

8. No significant difference was found in the number of cases of prostatic enlargement with regard to religion or dietary habits.

9. In the control group, between the age of 53 to 70 years, PSA value was found to be increasing with advancement of age and the value of PSA ranged between 2.4-3.8 ng/ml.

10. 30%, 45% and 25% of patients had prostate size between

20-40 gm, 41-60 gm and more than 60 gm respectively.

11. Serum PSA value of more than 10 ng/ml was found in 11.11%, 11.11% and 20% of patients having prostate size between 20-40 gm, 41-60 gm and more than 60 gm respectively. Thus, it can be concluded that serum PSA value increases with increase in the size of the prostate.

12. Sensitivity of PSA in detection of carcinoma prostate cases was calculated to be 81.8% and its positive predictive value was 31.03%.

13. Sensitivity of DRE was found to be 45.45% and its positive predictive value was 27.77% in detection of cases of carcinoma of prostate.

14. Sensitivity of trans abdominal USG was found to be 36.36% with a positive predictive value of 20% in detection of carcinoma of prostate.

DISCUSSION

Digital rectal examination as a diagnostic test in prostate enlargement

In the present study, digital rectal examination of all the 60 patients was done. On DRE, 42 patients had features of suggestive of benign prostatic enlargement whereas 18 patients had findings suspicious of prostatic cancer. Of the 18 patients who had DRE findings suggestive of prostate confirmed by histopathological examination. The sensitivity of DRE was 45.45% whereas the positive predictive value of DRE was 27.77% for detection of carcinoma prostate cases.

The positive predictive value of DRE according to Cooner et al[2] (1990) was 33% whereas the value was 50% according to study of Jewett et al (1956). They concluded that DRE misses 23% to 45% of prostate carcinoma cases; that were subsequently confirmed by prostate biopsy done for serum PSA abnormalities and TRUS-abnormalities.

The findings of DRE in this study were similar to the findings of other workers. The positive predictive value in this study was nearer to the values established by Cooner et al[2].

Although DRE is not a good parameter for diagnosis of prostate cancer, but it is a simple test and when indicative of malignancy, there is 30-50% chance of carcinoma being detected on prostate biopsy.

Relation of age group of patients to nature of prostatic enlargement i.e. benign and malignant

In the present study, patients were grouped in three age groups. In age group I (51-60 years), of 24 patients 2 patients had carcinoma prostate and 20 patients had benign prostatic hyperplasia and 2 patients had prostatic abscess. In age group II (61 to 70 years), out of 21 patients, 4 patients had carcinoma prostate whereas 17 patients had BPH. In age group III (71 to 80 years), among 15 patients, 5 patients had carcinoma of prostate and 10 patients had BPH (Fig -2).

Age is a significant risk factor in the development of carcinoma of prostate. The increase in incidence of carcinoma prostate with age is almost exponential and reaches its maximum at 80 years.

In inference drawn from the study is in accordance with results of other studies. In the present study, the carcinoma prostate incidence was found more in the group III age group whereas benign prostatic hyperplasia was more common in age group I and age group II. Wingo et al in 1995, found that the probability of developing prostate cancer was 1 in 8 for men in 60-79 years age whereas it was only 1 in 103 for men in 40-59 years of age.

Relation Of Level Of Serum Prostate Specific Antigen To Different Age Groups Of Patients

In this study, according to the value of PSA obtained patients were divided into three groups. Group-I consisted of patients having their PSA value less than 4 ng/ml and there were 31 patients in this group.

Group-II contained patients having PSA value between 4 to 10 ng/ml and there were 21 patients in this group. In Group-III, there were 8 patients and they had a PSA level of greater than 10 ng/ml.

In age group I (51-60 years), 16 patients had PSA less than 4 ng/ml, 7 patients had PSA value between 4-10 ng/ml and 1 patient had PSA greater than 10 ng/ml(Fig -3).

In age group I (61-70 years), 10 patients had PSA less than 4 ng/ml, 8 patients had PSA value between 4-10 ng/ml and 3 patients had PSA greater than 10 ng/ml(Fig -3).

In age group I (71-80 years), 5 patients had PSA less than 4 ng/ml, 6 patients had PSA value between 4-10 ng/ml whereas 4 patients had PSA greater than 10 ng/ml (fig -3).

The observation shows that the value of serum PSA increases with increase in age, which can be explained by the fact that with increase in age there is increase in volume of prostate causing this. The observation made is similar to findings established by Oesterling JE et al (1988)[3,4].

Prostate specific antigen in relation to size (weight) of prostate

In the present study, weight of the prostate gland and thickness of the gland ultrasonographically. The patients were categorized in three groups according to the weight of the prostate gland.

In Group-I patients having prostate weight of 20-40 gram were put and there were 18 such patients. Group-II consisted of patients with prostate weight of 41-60 gram and there were 27 patients in this group. In Group-III, patients with prostrate weight of greater than 60 grams were put and there were 15 such patients.

In Group-I (20-40 grams), there were 9 patients with PSA value of less than 4 ng/ml, 7 patients with PSA value between 4-10 ng/ml and 2 patients had PSA value greater than 10 ng/ml.

In Group-II (40-60 grams), there were 15 patients with PSA value of less than 4 ng/ml, 9 patients with PSA value between 4-10 ng/ml whereas 3 patients had PSA value greater than 10 ng/ml.

In Group-III (>60 grams), there were 7 patients having PSA level of less than 4 ng/ml, 5 patients had PSA value between 4-10 ng/ml whereas 3 patients had PSA level greater than 10 ng/ml.

It could be observed from the present study that PSA value of patients increased with increase in size (weight) of the prostate gland. It can be explained by increased secretion of PSA from higher number of epithelial cells in prostates of more weight and volume in patients of BPH and prostate cancer. Thus it can be compared to the findings established by Oesterling JE et al (1988)[3,4] and Benson M et al (1992)[5].

Role of PSA as a diagnostic tool in cases of carcinoma of prostate

In this study, the patients have been group into three groups depending upon their serum PSA values.

In Group-I, having PSA value less than 4 ng/ml, of 31 patients,

2 patients had carcinoma of prostate whereas 29 patients had benign prostatic hyperplasia related enlargement of prostate.

In Group-II, patients having PSA value between 4 to 10 ng/ml were put and of the 21 patients in this group, 6 patients had carcinoma of prostate whereas 14 patients had BPH related enlargement of prostate and 1 patient had enlargement due to prostatic abscess.

In Group-III with patients having PSA greater than 10 ng/ml, of 8 patients, 3 patients had carcinoma of prostate and 4 patients had BPH related prostatic enlargement and 1 patient had prostatic abscess.

In the present study, the sensitivity of serum PSA value of greater than 4 ng/ml for detection of carcinoma of prostate was 81.81% and the positive predictive value was 31.03%.

The positive predictive value of PSA greater than 4 ng/ml for carcinoma prostate as studied and calculated by different workers are as follows: -
Brawer et al (1992) – 31%
Labrie et al (1992) – 33%
Catalona et al (1991) – 34%

The positive predictive value of PSA in my study was 31.03%, which is nearer to the value given by Brawer et al (1992).

Catalona et al (1991)[(2)], Brawer et al (1992) and Stone et al (1994), concluded in their study that the probable chance of carcinoma prostate is 1 in 3 when PSA value lies between 4-10 ng/ml and it is 1 in 2 when PSA value is greater than 10 ng/ml.

In the present study in the PSA range of 4-10 ng/ml, 21 patients had carcinoma prostate i.e. approximately 1 in 3 patients had carcinoma prostate. In these patients with PSA value greater than 10 ng/ml, out of 8 patients, 3 patients had carcinoma prostate(Fig -4).

The results of the present study are similar to the observations made by Catalona et al (1991) and Brawer et al (1992).

Role of PSA in monitoring response of patients to treatment (Bilateral orchidectomy or anti-androgen therapy

Monitoring of serum PSA level was done in 5 patients of carcinoma prostate treated with either Bicalutamide therapy or bilateral orchidectomy. It was observed that PSA level decreased falling to its nadir after 3-6 months of treatment and it was associated with decrease in symptoms. In 2 cases of carcinoma prostate, where patients had bony metastasis, exacerbation of symptoms like increase in bone pain occurred after 9 months to 1 year after bilateral orchidectomy and it was associated with increase in serum PSA level to pretreatment values.

It shows the role of PSA as a tool, which can be used to monitor the response of patients to treatment as well as to diagnose recurrence or exacerbation of disease.

Prostate specific antigen value in normal individual of different age

In this study, 10 controls were selected from healthy individuals of different ages (who had no features of prostatic enlargement). Digital rectal examination of all the cases was normal and the PSA value of all of them was within the normal range of less than 4 ng/ml.

1. The result was similar to the study reports of Catalona et al (1993)(2,6,7) and Littrup et al (1994)(8,9) in which they had concluded that the standard reference range of PSA value i.e. 0.0 to 4.0 ng/ml is the most effective for screening purposes of cases of carcinoma of prostate.

Thus, serum PSA value of 4 ng/ml can be agreed to be standard cutoff for screening of carcinoma prostate cases and considered as the upper limit of normal PSA value.

CONCLUSION

There is physiological increase in serum PSA level with increase in age in absence of any prostatic disease and symptom.

In this study, it is concluded that the probability of carcinoma of prostate is 6.45% when PSA is less than 4 ng/ml, 28.57% when PSA level is 4-10 ng/ml and 37.50% when its value is greater than 10 ng/ml. Thus PSA has emerged as an important tumour marker for carcinoma of prostate and it can be used in screening of carcinoma prostate cases from patients of prostatic enlargement.

Serum PSA value helps in monitoring the response of treatment and disease recurrence or exacerbation after treatment in cases of carcinoma prostate.

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