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Original Research Article

Evaluation of Serum Acid Phosphatase Level in the Lesions of Prostate Gland and its Role as Tumour Marker in Advanced Carcinoma of Prostate and its Correlation with Histopathology

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Abstract: Acid phosphatase (ACP) enzyme, first demonstrated in the urine 1925, was found to be much more prevalent in male than in female. It was shown that prostatic tissue contains this enzyme in high concentration. Elevated serum levels of acid phosphates are seen in patients with prostatic carcinoma that has metastasized. One half to three fourths of patients with carcinoma of the prostate that has extended beyond the capsule have elevated acid phosphatase levels. However, patients with benign prostatic hypertrophy may have slight elevations of the serum acid phosphatase level after vigorous prostatic "massage". Since other tissues, such as erythrocytes, may also release acid phosphatase into the serum, minor elevations of enzyme levels may reflect such an origin rather than the prostate. Accordingly, efforts have been made to distinguish" prostatic" acid phosphatase from erythrocyte acid phosphatase have been based on the differential effect of various substrates and various inhibitors on enzymes.
Keywords: Serum Acid phosphatase, prostate carcinoma, histopathology of lesions of prostate gland

INTRODUCTION

Gutman *et al*. [1] found that carcinomatous prostatic tissues contain large amount of acid phosphatase properties. Later on, it was extensively studied again by Gutman [2] and found that high acid phosphatase content of prostatic carcinoma indicates tumor is not composed of functionally embryonic cells, but represents a type of malignancy made of physiologically mature cells. Large serum acid phosphatase determinations are done either according to Gutman's [1] adaptation of King-Armstrong's method for alkaline phosphates or Bodansky's method.

In the former, disodium monophynyl phosphate acts as a substrate; in the latter method, (3-glycerophosphate is used. The amount of phosphatase activity is expressed in units per 100 ml. of serum. Serum acid phosphatase is usually raised in carcinoma of the prostate with metastasis, but seldom above normal if the growth is confined to the gland of the patients whose cancer has grown beyond the capsule of the gland by local or distant spread. Only 73% show increased serum acid phosphatase (Arid, 1956).

Peters [3] stated that the prostatic malignant disease was often associated with a normal serum acid phosphatase level and the test was of little value in clinical assessment of most cases, particularly so in early cases. A low serum acid phosphatase cannot be accepted as an evidence of benign character of the prostatic tumour. A patient with extensive metastasis sometimes has normal phosphatase level. Normal levels in the presence of metastasis may be due to failure of anaplastic tumour cells to produce acid phosphatase, while levels above normal in the apparent absence of metastasis may be due to failure of bone changes which are recognizable on x-ray film to develop. On the other hand, there may be no increase in the enzyme (Boyd.1961). Slightly increased value is not uncommon in acute prostatitis after prostatic massage.

Nesbit & Baunn [4] found raised acid phosphatase level in 39.9% of 1150 patients, while other workers have reported the increase in acid phosphatase in 50% cases [5].

The likely sources of this enzyme besides prostate are erythrocytes and platelets; especially the erythrocytes are known to have substantial acid

phosphatase activity [6]. The blood platelets are good source of acid phosphatase [7]. Acid phosphatase levels cannot yet be used arithmetically to estimate the progress of prostatic cancer or to distinguish malignant from benign prostatic enlargement. Serum acid and alkaline phosphatase estimations are of no use in differentiating benign hyperplasia, chronic inflammatory conditions and early carcinoma of the prostate. A positive histological evidence will only avoid mistakes in diagnosis and treatment, particularly so in cases of certain chronic inflammatory states, which resemble carcinoma in all respects and also certain soft type of carcinomas, which resemble benign enlargement.

MATERIAL AND METHODS

All the 50 cases of prostatic enlargement were subjected to Serum Acid phosphatase estimation.

Principle

ACP (acid phosphatase) of an acidic pH hydrolyses α- Nephthylphosphate to form α- Nephthol and inorganic phosphate Hiliman, G.C [8] and Seiler D *et al*. [9]. The α- Nephthol formed is coupled with Fast Red TR salt to form a diazole dye complex. The rate of formation of the complex is measured as an increase in absorbance which is proportional to the ACP activity in the sample. Tartrate inhibits prostate ACP and the lasting in its presence in done to find the non- prostate ACP. The difference between the activities of the total and non total prostate ACP gives the activity of the prostate ACP. α - Nephthylphosphate + H_2O -----→ α-Naphthol + phosphate α-Nephthol + Fast Red TR salt Dazo dye complex.

Expected value: MALE- upto 4.2u/l to 4.7 u/l
Female- upto 3.0u/l to 3.7 u/l
Prostatic ACP - upto 1.5 u/l to 1.8 u/l

It is recommended that each laboratory establish the mean range representing the patient population**.**

OBSERVATIONS

The test data were recorded in excels work — sheet and analyzed for result. All the 50 cases of prostatic enlargement were conducted for serum acid phosphatase level. Analysis was done in deferent type of prostatic lesions. Table shows as follows:

Serum Acid phosphatase level	Biopsy
Done by α – Nephthylphosphate kinetic method	Histopathological diagnosis

1- SAP Level were within normal range - in 4 cases of Benign prostatic hyperplasia 2- SAP Level were recorded within normal- in 32 cases of Benign prostatic hyperplasia Range with chronic prostatitis . 3- SAP Level was recorded severely increased in 2 cases of Adenocarcinoma (2 cases of poorly — differentiated adenocarcinoma).

Total of 50 cases of prostatic enlargement admitted in Varun Arjun medical college and Hospital Shahjahanpur, were assessed for eligibility from December 2015 to December 2016. All 50 cases were investigated routinely in the pathological laboratory for Hb%, TLC, DLC,, Blood Urea, Acid Phosphatase, Urine examination for albumin, sugar and microscopic examination. Histopathology was done special for correlation. Serum acid phosphatase was estimated in all the cases.

Prostatic massage was done 24 hours before the collection of the sample. Samples were collected on empty stomach**.**

Table-1: Prostatic Enlargements in Age Incidence in Study Group (50 cases)

Age In Years	No. Of Cases	Percentage
31- 40	1	2%
41- 50	7	14%
51- 60	13	26%
61- 70	16	32%
71-80	10	20%
81-90	3	6%

The highest incidence of prostatic enlargement is seen in 6^{th} decade followed by 5^{th} decade and least in 3 rd decade.

Presenting clinical symptoms and their percentage in prostatic enlargement-- Out of the 50 cases, 92% patients presented with frequency of micturation followed by 90% of acute retention with dysuria and 16% presented with retention with overflow. 6 % presented with Haematuria.

Duration of illness and their percentage--- The maximum duration was 10 months and minimum duration was 10 days. 27 cases out of 50 cases, whose duration was between 1 month and 3 months (54%) and

few cases had duration between 10 months and 12 months (2%).

In the rectal digital examination of 50 cases of prostatic obstruction , the massive enlargement was seen in 3 cases (6%), 27 cases (54%) showed moderate enlargement and rest 20 cases (40%) showed mild enlargement, 17 cases out of 27 cases of moderate enlargement were between 5^{th} and 6^{th} decade. Out of 50 cases, 41 cases (82%) had firm in consistency, only one case (2%) showed firm to hard in consistency.

Almost all 47 cases (94%) had lateral lobe enlargement , only 3 cases (6%) had a medium groove obliteration, out of 47 cases, 36 cases were in 5^{th} to 7^{th} decade.

Blood urea levels at the time of admission -- The prostatic obstruction of 50 cases, whose blood urea was measured at the time of admission. The maximum 45 cases (90%). whose blood urea were in normal range, 5 cases (10%), out of 50 cases revealed above 40 mg %.

Table-2: Range of Acid phosphatase (Ul/L) in all 50 cases of prostatic enlargement

Acid phosphates level	No. of cases	percentage
2.5-5.0	3	6
5.1- 7.5	10	20
7.6- 9.5	33	66
9.6- 11.0	2	4
11.1- more	2	4

Out of 50 cases, 40 patients (96%) showed acid phosphatase in normal range (2.5 to 11 UI/L) and 2 patient (4%) showed higher level. The maximum number 33 cases (66%) fall in The range of 7.6 to 9.5 U/L.

DISCUSSION

A study of pre-operative serum acid phosphatase of 50 cases of prostatic obstruction (prostatic enlargement) has been done to evaluate the reliability of the prostatic acid phosphatase regarding its accuracy and dependability and to correlate from serum acid phosphates with post operative histopathology. Patients admitted to Varun Arjun medical college and Hospital.

With symptoms of prostatic obstruction between, were duly interrogated and after physical examination, including rectal examination, clinical diagnosis based on rectal examination were done.

Acid phosphatase is specific for specified for diagnosis of prostatic enlargement as Gutman *et al*. [1] found that carcinomatous prostatic tissue contained large amount of acid phosphatase. The high acid phosphatase content of prostatic carcinoma indicates that the tumour is not exposed functionally embryonic cells but represent a type of malignancy of physiologically mature cells. Serum acid phosphatase is raised in carcinoma of prostate with metastasis but

Seldom above normal or in suspicious range, is the growth confined to the gland.

In about 40% cases of patient with carcinoma of prostate, the acid phosphates are raised above normal. A reading between 9-11 Ul/L is practically suspicious of carcinoma of prostate and above 11.00 Ul/L is practically diagnostic. Very high level can be found at time in patient showing extensive bone marrow involvement.

ACP was an independent predictor of tumor recurrence in prostatic carcinoma [13]

Nesbit and Baunn [4] have shown raised serum acid phosphatase level in 39.9 % of malignant prostate. But in present study, out of 3 cases of carcinoma prostate, 2 cases were obtained with suspicious limit of acid phosphates for carcinoma and one case obtained was having acid phosphates more than 11 U/L unit. Two cases which showed high level acid phosphatise, bone marrow were done for confirmation of bone marrow metastasis. They showed bone marrow metastasis.

CONCLUSION

In our present study of 50 cases of prostatic enlargement, following conclusions were drawn as follows:

Dysuria, frequency, thinness of stream and poor force are the early symptoms of prostatic obstruction. Acute retention was the presenting complaint in majority of cases. The duration of the symptoms was short (10-2 month) in malignant condition in comparison to benign hyperplasia (1-10 months). The size of the prostate assessed by rectal examination was not proportional to the severity and duration of symptoms. Prostate acid phosphatase is a reliable method in diagnosing metastasing carcinoma of prostate gland, infiltrated into bone marrow. Serum acid phosphatase level above the normal is always significant for prostatic lesions. Bone marrow was conducted to all patients who showed high level of acid

phosphatise (above 11.0UI/L) showing bone marrow metastasis.

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