EVALUATION OF CHANGES IN THE LEVELS OF PROSTATE SPECIFIC ANTIGEN (PSA) AND PROSTATIC ACID PHOSPHATASE IN PATIENTS PRESENTING WITH URINARY RETENTION AND PROSTATE DISEASE

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ABSTRACT

Prostate specific antigen (PSA) has established itself as the most useful marker for adenocarcinoma of the prostate (ADCA) adenocarcinoma of the prostate and in the recent years has almost replaced the total acid phosphatase and prostatic acid phosphatase prostatic acid phosphatase (PAP) for screening, diagnosis and monitoring the prostate carcinoma patients. The prostate specific antigen levels also rise in benign prostatic hypertrophy benign prostatic hypertrophy but to a lesser extent and high values are usually diagnostic of malignant disease. A cross-sectional comparative study was planned to see the effect of urinary retention and catheterization on plasma concentration of adenocarcinoma of the prostate and prostatic acid phosphatase and the value of this effect in the diagnosis of patients as having benign prostatic hypertrophy or adenocarcinoma of prostate. Sixty patients with prostatic disease were included in the study. Adenocarcinoma of the prostate and prostatic acid phosphatase levels were assessed in all patients. The patients were divided into two groups; group I are those presented with urinary retention and catheterization and group II those presented without urinary retention (without catheter). Following histological examination of prostatic tissues, the patients were diagnosed as cases of benign prostatic hyperplasia or adenocarcinoma of prostate. The data were analyzed using t-test. Benign prostatic hypertrophy was detected in 48 patients whereas 12 patients were diagnosed with adenocarcinoma of the prostate. In the study, 66.2% of benign prostatic hypertrophy and 50% of adenocarcinoma of the prostate patients presented with urinary retention and catheterization. It was observed that prostate specific antigen levels were significantly raised in benign prostatic patients with urinary retention and catheterization as compared to those with no retention. There was, however, no significant rise in prostatic acid phosphatase levels in those patients. In conclusion, prostatic acid phosphatase is still a very good tumor marker of prostatic disease in differentiating the malignant from the benign disease. It appears to be particularly important in patients with benign prostatic hyperplasia and urinary retention as catheterization appears to raise significantly the levels of prostate specific antigen but not those of prostatic acid phosphates. This finding means that patients presenting with urinary retention and catheterization and high prostatic acid phosphates levels are more likely having carcinoma of the prostate because retention and catheterization don't significantly raise the prostatic acid phosphates levels in benign prostatic hypertrophy as they raise prostate specific antigen levels in such patients.

INTRODUCTION

Benign prostatic hypertrophy benign prostatic hypertrophy is a common condition in men above 60 years of age.[1] Adenocarcinoma of prostate is the most common visceral malignant neoplasm in men and the second leading cause of cancer- related deaths in the United States.[1] Worldwide, prostate cancer incidence and mortality rates vary significantly between countries and regions.[2] Prostatic acid phosphatase is a glycoprotein dimmer of molecular weight 102,000.[3] It has been used for early screening and detection of prostate carcinoma in high risk group, although its role in staging the carcinoma has been doubtful.[4,5] Prostate specific antigen adenocarcinoma of the prostate, first identified by Wang et al,[6] is a 237-amino acid monomeric serine protease, with a molecular weight of 33-34 kilo Daltons.[6] It has shown considerable promise and has been acclaimed the best marker for prostate malignancy in recent years,[7] although its plasma concentration also increases in benign prostatic hypertrophy, but to a lesser extent.[7] The reduced specificity of the two markers is further complicated by a number of pathological factors like prostatic infarct, acute bacterial prostatitis as well as acute urinary retention or digital rectal examination (DRE).[8,9] Since a majority of the prostate disease patients are referred to the hospital after urinary retention and catheterization, the levels of tumor markers may be falsely elevated in these patients.

The present study was planned to see the effect of urinary retention and catheterization on plasma concentration of adenocarcinoma of the prostate and prostatic acid phosphatase and the value of this effect in the diagnosis of patients as having adenocarcinoma of prostate.

PATIENTS AND METHODS

The serum samples were collected from 60 patients with prostatic disease, who presented at the urology clinic of Basrah General Hospital or

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were referred from private clinics during the period between October 2007 to October 2009. The patients were divided into two groups; Group I those presented with urinary retention and catheterization and Group II those without urinary catheters (non retention group). Group I are included 38 patients and Group II included 22 patients. Patients who presented with urinary retention were scheduled for transurethral resection of the prostate (TURP), while those who didn't need surgery were subjected to transperineal prostatic biopsy if they have abnormal findings that suggested harboring carcinoma of the prostate like abnormal adenocarcinoma of the prostate values or abnormal DRE. The tissue slices (chips) collected after transurethral resection of prostate (TURP) or prostatic biopsy obtained through the transperineal approach were sent to histopathology laboratory for the final diagnosis and the patients were grouped accordingly. A careful clinical examination including DRE was also performed. On the basis of biopsy reports 48 patients were diagnosed to have benign hypertrophy benign prostatic hypertrophy and 12 patients to have adenocarcinoma of the prostate of prostate. Serum adenocarcinoma of the prostate and prostatic acid phosphatase levels were estimated, in the blood samples which were drawn before digital rectal examination or catheterization, by immunoassays using the vidas technique or the commercial kits designed to assess the levels of prostatic acid phosphatase. The kit is designed to measure the total adenocarcinoma of the prostate (free adenocarcinoma of the prostate as well as the adenocarcinoma of the prostate bound to different proteins) in the patient's serum. The results were analyzed using t-test. A P-value less than 0.05 was considered significant.

RESULTS

The patient's in the study ranged from 45 years to 80 years with maximum cases belonging to 6th or 7th decades of life. Majority of the patients in both groups presented with symptoms of urinary obstruction, frequency of micturition, nocturia and hesitancy, whereas in the adenocarcinoma of the prostate group 25% of patients presented with bone pain. Six patients (50%) of the adenocarcinoma of the prostate and 66.2% of benign prostatic hypertrophy patients presented with urinary retention and catheterization. The normal value of adenocarcinoma of the prostate is 0 - 4.0 ng/ml and that for prostatic acid phosphatase 0 - 1.8 ng/ml. [10] In general, both tumor markers showed significantly higher concentrations in adenocarcinoma of the prostate patients as compared to those with benign disease. All the adenocarcinoma of the prostate patients (both with and without catheters) had adenocarcinoma of the prostate as well as prostatic acid phosphatase levels elevated above the corresponding normal ranges (Tables 1 and 2). The serum adenocarcinoma of the prostate was significantly elevated in benign prostatic hypertrophy patients with catheters (mean 9.21±2.6 ng/ml). On the other hand, benign prostatic hypertrophy patients with catheters showed slight elevation of prostatic acid phosphatase above the normal level (mean 1.91± 0.3 ng/ml) which was shown to be insignificant. The corresponding values for patients without catheters were (4.3±1.2 ng/ml and 1.4±0.2 ng/ml), respectively (Table 1 & 2).

Table 1. Mean adenocarcinoma of the prostate levels in patients with benign prostatic hypertrophy and adenocarcinoma of the prostate with and without catheters.

Patients Groups	No.	Mean adenocarcinoma of the prostate Ng /Ml ± SD	P-value
Benign prostatic hypertrophy patients with catheters	32	9.21 ± 2.6	0.05
Benign prostatic hypertrophy patients without catheters	16	4.3 ± 1.2	
Adenocarcinoma of the prostate patients with catheters	6	32.1 ± 5.4	0.01
Adenocarcinoma of the prostate patients without catheters	6	18.5 ± 3.7	

Table 2. Mean prostatic acid phosphatase levels in patients with benign prostatic hypertrophy and adenocarcinoma of the prostate with and without catheters.

Patients groups	No.	Mean prostatic acid phosphatase Ng /Ml ± SD	P Value
Benign prostatic hypertrophy patients with catheters	32	1.91 ± 0.3	0.1
Benign prostatic hypertrophy patients without catheters	16	1.4 ± 0.2	
enocarcinoma of the prostate patients with catheters	6	20.5 ± 2.2	0.1
adenocarcinoma of the prostate patients without catheters	6	18.1 ± 2.0	

Amongst the 32 benign prostatic hypertrophy patients with urinary retention (catheters), 18 has elevated adenocarcinoma of the prostate levels, 3 of these patients even showed adenocarcinoma of the prostate concentrations above 25 ng/ml (Table-3). In the non-retention subgroup, only 5 out of 16 had above normal (>4.0 ng/ml) adenocarcinoma of the prostate concentrations and in none of these patients the adenocarcinoma of the prostate concentration was more than 25 ng/ml (Table- 3). The number of (benign prostatic hypertrophy) patients with elevated prostatic acid phosphatase levels, on the other hand, was only 18(37.5%) out of 48 divided as 11(34.4%) with catheters and 7(43.7%) without catheters, no patient in either of the groups showed prostatic acid phosphatase more than 10 ng/ml (Table-4). Table (4) also shows that 21(65.6%) benign prostatic hypertrophy patients with catheters had normal prostatic acid phosphatase levels compared to only 11(34.4%) patients with catheters who had prostatic acid phosphatase levels above normal. So the majority of benign prostatic hypertrophy patients with catheters have prostatic acid phosphatase levels within the normal value. The mean prostatic acid phosphatase concentration in adenocarcinoma group was also significantly higher than in benign prostatic hypertrophy group in both patients with and without catheters (Table-2). The adenocarcinoma patients showed a wider range of elevations of prostatic acid phosphatase (up to 40 ng/ml) compared to benign prostatic hypertrophy group. The mean prostatic acid phosphatase (1.4±0.2 ng/ml) in benign prostatic hypertrophy group without catheters was within the normal limit, i.e., 1.8 ng/ml (Table-2). For adenocarcinoma patients, both tumor markers were significantly raised for both catheterized and non catheterized patients.

Table 3. Distribution of benign prostatic hypertrophy Patients with catheters (urinary retention) and patients without catheters (non-retention) according to adenocarcinoma of the prostate level.

PSA level NG/ML	Total number of patients No. (%)	Patients with catheters No. (%)	Patient without catheters No. (%)
0.0	25 (52)	14 (29.1)	11 (22.9)
4.1-10.0	11 (22.9)	8 (16.6)	3 (6.25)
10.1-25.0	9 (18.75)	7 (14.5)	2 (4.1)
>25.0	3(6.25)	3(6.25)	0(0.0)

Table 4. Distribution of benign prostatic hypertrophy patients with catheters (urinary retention) and patients without catheters (non-retention) according to prostatic acid phosphatase level.

PAP level NG/ML	Total number of patients No. (%)	Patients with catheters No. (%)	Patient without catheters No. (%)
0.0 – 1.8	30 (62.5)	21 (43.75)	9 (18.75)
1.9 – 10.0	18 (37.5)	11 (22.9)	7 (14.6)
> 10.0	0 (0)	0 (0)	0 (0)

DISCUSSION

In this study the relative values of adenocarcinoma of the prostate and prostatic acid phosphatase in differentiating prostatic carcinoma from hyperplasia have been compared particularly with regard to the patients with urinary retention and catheterization. The mean adenocarcinoma of the prostate (4.3±1.2 ng/ml) in benign prostatic hypertrophy group (without catheters) was above the reference normal range and compares well with that reported in literature.[11] Saraswati and Malathi[12] working with almost similar population of patients reported elevated adenocarcinoma of the prostate levels in all the 30 pretherapy adenocarcinoma patients. Urinary retention was one of the major presenting symptoms in this study. The adenocarcinoma of the prostate levels are increased in benign prostatic hypertrophy patients presenting with catheters and values as high as 118.2 ng/ml have been reported[13] in such conditions, whereas elevations in the prostatic acid phosphatase levels have also been observed by few workers.[13] Therefore, it appears that prostatic acid phosphatase is still a good marker for benign prostatic disease in which case it shows very mild alterations even in the presence of the complications like urinary retention which raises the adenocarcinoma of the prostate concentrations to the levels generally representing the cancerous state. This rise in the levels of adenocarcinoma of the prostate with urinary retention may be due to retention pressure and/or physical stimulation by catheterization. Elevated serum adenocarcinoma of the prostate levels are probably a product of disruption of cellular architecture within the prostate gland.[14] Oremak and Seiffert[15] studied 301 healthy volunteers and reported that physical activity increases the adenocarcinoma of the prostate levels by threefold whereas prostatic acid phosphatase levels showed minimal elevations. Therefore, it appears that the amplitude of elevation of prostatic acid phosphatase levels in benign prostatic hypertrophy patients is very low compared to adenocarcinoma of the prostate which suggested different mechanisms for increase in serum adenocarcinoma of the prostate and prostatic acid phosphatase levels. Further, all of the serum adenocarcinoma of the prostate might not be of prostatic origin in these cases, because adenocarcinoma of the prostate no longer enjoys the 100% tissue specificity acclaimed earlier.[16] The immunoreactive adenocarcinoma of the prostate might be contributed by periurethral glands[17] to some extent, particularly in patients with urinary retention. This study suggests that the adenocarcinoma of the prostate is significantly raised in benign prostatic hypertrophy patients with urinary retention and catheters, whereas prostatic acid phosphatase is not significantly raised. The rise in prostatic acid phosphatase values by urinary retention and catheterization is too small to affect the average and cut-offs values and hence the performance of the assay of this tumor marker for patients with benign prostatic hypertrophy.

In conclusion, The present study concluded that prostatic acid phosphatase is still a very good tumor marker of prostatic disease with almost comparable efficiency to that of adenocarcinoma of the prostate in differentiating the malignant from the benign disease. This is particularly important in patients with benign prostatic hyperplasia and urinary retention as catheterization appears to raise significantly the levels of adenocarcinoma of the prostate but not those of prostatic acid phosphatase. This means that patients with catheters and high prostatic acid phosphatase levels are mostly having carcinoma of the prostate because catheterization does not significantly raise the levels of prostatic acid phosphatase in patients with benign disease as it raises adenocarcinoma of the prostate levels in such patients.

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