PROSTATE SPECIFIC ANTIGEN, ALKALINE PHOSPHATASE, UREA, CREATININE AND HEMOGLOBIN IN BENIGN PROSTATIC HYPERPLASIA AND CARCINOMA PROSTATE

ABSTRACT

Objective: In benign prostatic hyperplasia and carcinoma prostate not only prostate specific antigen levels are altered but the levels of other chemical parameters like alkaline phosphatase, urea, creatinine and hemoglobin are also changed. Purpose of this study was same.

Design: Case-control study.

Subjects and Methods: From the study population of 250 subjects 93 were selected, representing the normals, BPH and CaP cases. Prostate specific antigen, alkaline phosphatase, urea, creatinine and hemoglobin were estimated.

Results: Mean PSA concentration was highly significant (P=0.001) when normals were compared with BPH and CaP case. Significant differences in ALP levels were observed in normals versus CaP cases (P<0.01); BPH versus CaP cases (P=0.01). Serum urea and creatinine levels were insignificant in all the groups. Levels of hemoglobin showed highly significant differences (P=0.001) when normal were compared with CaP cases

Conclusion: PSA increases in both BPH and CaP but marked changes were seen in CaP cases but as the carcinoma further progresses changes in ALP and Hb do occur, which should be given due consideration during the management of these diseases.

Key words: BPH = Benign Prostatic Hyperplasia, CaP = Carcinoma prostate, PSA = Prostate specific antigen, ALP=Alkaline phosphatase, Hb = Hemoglobin
nation blood samples were collected, freezed till assayed except the sample for hemoglobin which was collected in sodium citrate containing test tube and was tested immediately. PSA was done by using total PSA assay on Abbott AxSYM system. Urea and alkaline phosphatase were estimated by kits of Randox laboratories, U.K.; creatinine estimation was done by using Roche Diagnostics, USA, kits, on Hitachi-911 analyzer. Hemoglobin was estimated on Sysmex Automatic hematology analyzer, SF-3000.

Values were expressed as mean and standard error of mean (s.e.m.), and Students t-test was applied. The data analysis was done on SSP version 10.

RESULTS

Table-1 shows the mean value of prostate specific antigen (PSA), alkaline phosphatase (ALP), urea, creatinine and hemoglobin (Hb) in normal, benign prostatic hyperplasia (BPH) and carcinoma prostate (CaP) cases.

Table-2 shows the comparison of PSA, ALP, urea, creatinine and hemoglobin (Hb) in normal, BPH and CaP case.

When comparing normal with BPH cases, the concentration of PSA was found highly significant (P=0.001), concentrations of ALP, urea, creatinine and Hb were statistically non-significant.

When comparing normal with CaP cases, the concentration of prostate specific antigen and Hb were highly significant (P<0.001), concentrations of ALP was significant (P<0.01) whereas concentrations of urea, creatinine were statistically non-significant.

DISCUSSION

In this study we saw the effect of benign prostatic hyperplasia and carcinoma prostate on prostate specific antigen, alkaline phosphatase, urea, creatinine, and hemoglobin, because in carcinoma prostate cases these parameters are altered due to metastasis effecting different systems of the body.

In present study, it was found that mean PSA concentration was highly significant (P=0.001) when normals were compared with BPH and CaP cases. Bangma et al's data match with the present study in case of BPH cases, whereas in CaP case mean values were lower than the present study. It could be because of the age range of the study group that was from 54-77 years. Results of Roehrborn et al regarding mean PSA concentration in normal and BPH cases match with this study, however their age group for BPH cases included subjects with 40-70 years, whereas that of normals was from 30-49 years. In the study of Carter et al values in CaP cases were lower than this study. It might be because of their selection of patients with curable cancer and with non-palpable disease. Results of Stamey et al, Collins, DeAntoni, Oesterling et al, Recker et al, Cooney et al, Tanguay et al, and Fukatsu et al for PSA level were comparable with present study.

Alkaline phosphatase is a chemical parameter that is characteristically increased when there is metastasis in the bone, as it is an indicator of osteoblastic activity. ALP levels showed significant differences when comparisons were made between normals and CaP cases (P<0.01), and BPH and CaP cases (P=0.01). Casetta et al noted a vast difference in alkaline phosphatase levels between normals and CaP cases, a finding that is similar to present study. de L Pierda et al considered BPH and CaP cases, they found significantly higher values for ALP in CaP cases, which was similar to present study in case of CaP group only. We failed to find any contradictory study.

Two parameters urea and creatinine were performed to rule out the urinary obstruction cases due to causes other than BPH and CaP, as they are not meant for the diagnosis or prognosis of these diseases. Serum urea and creatinine levels in this study showed insignificant differences when all the groups were compared. It has been found that serum creatinine level rises in chronic renal failure and the progress of renal disease is better correlated with serum levels of urea along with creatinine. Gerber et al found the serum creatinine levels for normal cases, comparable to present study. He considered serum creatinine measured in men with urinary tract symptoms secondary to BPH.

### TABLE-I

CHEMICAL PARAMETERS IN NORMAL, BENIGN PROSTATIC HYPERPLASIA AND CARCINOMA PROSTATE CASES

(The values are expressed as mean ± standard error of mean)

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Normal (n=31) Mean ± s.e.m.</th>
<th>BPH (n=31) Mean ± s.e.m.</th>
<th>CaP (n=31) Mean ± s.e.m.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSA (ng/mL)</td>
<td>0.75 ± 0.10</td>
<td>4.61 ±1.04</td>
<td>148.39 ± 39.89</td>
</tr>
<tr>
<td>Alkaline phosphatase (U/L)</td>
<td>82.35 ± 4.9</td>
<td>87.90 ± 10.25</td>
<td>208.45 ± 41.29</td>
</tr>
<tr>
<td>Urea (mg/dl)</td>
<td>32.58 ± 2.02</td>
<td>34.35 ± 2.35</td>
<td>36.74 ± 2.92</td>
</tr>
<tr>
<td>Creatinine (mg/dl)</td>
<td>1.08 ± 0.06</td>
<td>1.30 ± 0.15</td>
<td>1.46 ± 0.30</td>
</tr>
<tr>
<td>Hemoglobin (gm/dl)</td>
<td>13.64 ± 0.25</td>
<td>12.89 ± 0.35</td>
<td>11.92 ± 0.41</td>
</tr>
</tbody>
</table>

Key:
- BPH = Benign prostatic hyperplasia
- CaP = Carcinoma prostate
- PSA = Prostate specific antigen
Levels of hemoglobin in this study showed highly significant differences (P=0.001) when normal cases were compared with CaP cases. Tauheed found hemoglobin levels in smokers, ischemic heart disease patients and hypertensives. Only the normal group of his study was considered which matched with the results of present study. It has been suggested that anemia in cancer may be secondary to blood loss, displacement of normal bone marrow cells by malignant cells, myelotoxic therapy or the tumor itself.

CONCLUSION
It was concluded from the present study that PSA increases in both BPH and CaP but marked changes are seen in CaP cases, moreover, due to the progress of carcinoma changes in ALP and Hb do occur as a result of metastasis, therefore, while managing these diseases the conditions associated with them (e.g. anemia) must be treated too, so that the patients health stability can be maintained.

ACKNOWLEDGEMENTS
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REFERENCES:
8. Collins GN, Lee RJ, McKllvie GB, Rogers CAN and Hehir M. rela-
tent prostate specific antigen serum forms in the detection of prostate

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Normal vs. BPH</th>
<th>Normal vs. Ca</th>
<th>PBPH vs. CaP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>t</td>
<td>df</td>
<td>P</td>
</tr>
<tr>
<td>PSA (ng/mL)</td>
<td>3.70</td>
<td>60</td>
<td>0.001****</td>
</tr>
<tr>
<td>Alkaline phosphatase (U/L)</td>
<td>0.49</td>
<td>60</td>
<td>0.63*</td>
</tr>
<tr>
<td>Urea (mg/dl)</td>
<td>0.57</td>
<td>60</td>
<td>0.57*</td>
</tr>
<tr>
<td>Creatinine (mg/dl)</td>
<td>1.37</td>
<td>60</td>
<td>0.18</td>
</tr>
<tr>
<td>Hemoglobin (gm/dl)</td>
<td>0.74</td>
<td>60</td>
<td>0.09*</td>
</tr>
</tbody>
</table>

*Non-significant
**P<0.05, ***P<0.01, ****P<0.001

Key:
BPH = Benign prostatic hyperplasia
CaP = Carcinoma prostate
PSA = Prostate specific antigen

Author’s contribution:

Dr. Zehra Naz: The researcher of the study; who has conducted the study, written the manuscript, and interpreted the results.

Dr. Saadia Anjum: Supervisor.

Conflict’s of interest:

None.

Role of funding:

No fund was given but study was supported by SIUT.

Ethics:

Verbal consent was taken from the subjects prior to the conduction of study.