

# Assessment of AST/ALT ratio as a significant predictor of the incidence risk of prostate cancer

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## Abstract

**Background:** Prostate cancer (PCa) is the second most frequent malignancy in men worldwide. The present study was conducted to assess AST/ALT ratio as a significant predictor of the incidence risk of prostate cancer.

**Materials & Methods:** 110 patients of suspected benign prostatic hyperplasia (BPH) and PCa were enrolled. Blood samples were collected 1-7 days before surgery. PSA value before biopsy was collected. The upper limit of the reference range, in consideration, was 40 IU/L for AST and 56 IU/L for ALT.

**Results:** There were 50 cases of PCa and 60 cases of BPH. The mean age was 6.5 years and 67.2 years, BMI (Kg/m<sup>2</sup>) was 24.1 and 24.6, diabetes was present in 6 and 8, CAD in 10 and 7 and hypertension in 23 and 25 in PCa and BPH patients. The difference was non-significant ( $P > 0.05$ ). The mean PSA level  $< 10$  ng/ml was seen in 12 and 28,  $> 10$  ng/ml in 38 and 32, Gleason Score  $< 6$  was seen in 11, 7 in 15 and value 8 in 24, mean ALT(IU/L) was 20.1 and 21.6, AST(IU/L) was 20.6 and 19.8 and AST/ALT ratio was 1.14 and 1.21 in PCa and BPH patients respectively. The difference was significant ( $P < 0.05$ ). Risk factors of prostate cancer was AST/ALT ratio and age.

**Conclusion:** AST/ALT ratio was an independent factor in predicting the incidence of PCa.

**Keywords:** benign prostatic hyperplasia, Gleason Score, Prostate cancer

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## INTRODUCTION

Prostate cancer (PCa) is the second most frequent malignancy (after lung cancer) in men worldwide, counting 1,276,106 new cases and causing 358,989 deaths (3.8% of all deaths caused by cancer in men) in 2018.<sup>1</sup> The incidence and mortality of prostate cancer worldwide correlate with increasing age with the average age at the time of diagnosis being 66 years. Of note, for African-American men, the incidence rates are higher when compared to the White men, with 158.3 new cases diagnosed per 100,000 men and their mortality is approximately twice as White men.<sup>2</sup>

Among liver enzymes, AST/ALT ratio is considered for the prediction of prognosis in patients with certain cancers. A low AST/ALT ratio was an independent prognostic factor of long-term survival among patients with primary hepatic carcinoma.<sup>3</sup> In terms of cancer types other than those affecting the hepatobiliary tract, an elevated serum AST/ALT ratio was associated with better prognosis in patients with gastric, oral and oropharyngeal, pancreatic, and prostate cancers. The chemical indicators to better predict the occurrence and development of PCa. Aspartate aminotransferase (AST) and alanine aminotransferase (ALT)

are the major circulating enzymes in the serum.<sup>4</sup> Their serum levels not only indicate liver cell damage and death but also serve as predictors in predicting several malignant tumors such as pancreatic cancer and breast cancer. Therefore, the AST/ALT ratio would be useful for predicting survival in patients with cancer.<sup>5</sup> The present study was conducted to assess AST/ALT ratio as a significant predictor of the incidence risk of prostate cancer.

## MATERIALS & METHODS

The present study comprised of 110 patients of suspected benign prostatic hyperplasia (BPH) and PCa. All agreed to participate in the study.

Data such as name, age, gender etc. was recorded. All underwent ultrasound-guided prostate biopsy and pathological examination confirmed PCa or benign prostate lesions. Blood samples were collected 1-7 days before surgery. PSA value before biopsy was collected. The upper limit of the reference range, in consideration, was 40 IU/L for AST and 56 IU/L for ALT. Data thus obtained were subjected to statistical analysis. P value  $< 0.05$  was considered significant.

## RESULTS

**Table I:** Distribution of patients

Parameters	PCa (50)	BPH (60)	P value
Mean age (years)	65.4	67.2	0.82
BMI (Kg/m <sup>2</sup> )	24.1	24.6	0.94
Diabetes	6	8	0.12
CAD	10	7	0.72
Hypertension	23	25	0.95

Table I shows that there were 50 cases of PCa and 60 cases of BPH. The mean age was 65.4 years and 67.2 years, BMI (Kg/m<sup>2</sup>) was 24.1 and 24.6, diabetes was present in 6 and 8,

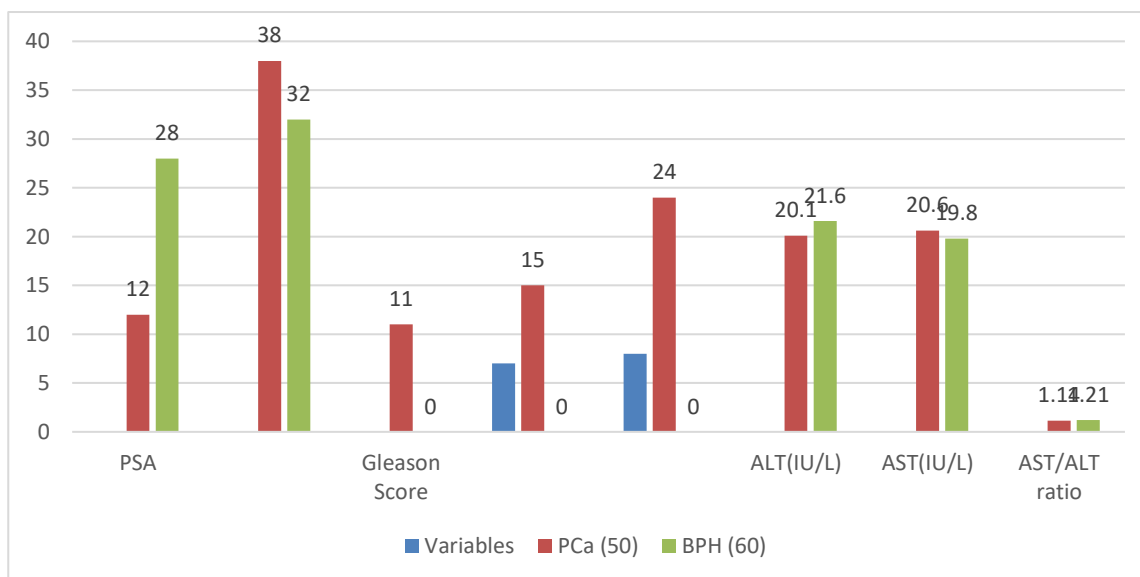
CAD in 10 and 7 and hypertension in 23 and 25 in PCa and BPH patients. The difference was non-significant (P > 0.05).

**Table II:** Comparison of laboratory parameters

Parameters	Variables	PCa (50)	BPH (60)	P value
PSA	<10 ng/ml	12	28	0.91
	>10 ng/ml	38	32	
Gleason Score	<6	11	0	0.12
	7	15	0	
	8	24	0	
ALT(IU/L)		20.1	21.6	0.75
AST(IU/L)		20.6	19.8	0.82
AST/ALT ratio		1.14	1.21	0.05

Table II, graph I shows that mean PSA level <10 ng/ml was seen in 12 and 28, >10 ng/ml in 38 and 32, Gleason Score <6 was seen in 11, 7 in 15 and value 8 in 24, mean ALT(IU/L) was 20.1 and 21.6, AST(IU/L) was 20.6 and 19.8

and AST/ALT ratio was 1.14 and 1.21 in PCa and BPH patients respectively. The difference was significant (P < 0.05).



**Graph I:** Comparison of laboratory parameters

**Table III:** Risk factors for the incidence of PCa

Variables	OR	P value
AST/ALT ratio	2.35	0.01
ALT	1.01	0.08
AST	0.91	0.14
Age	1.23	0.02

Table III shows that risk factors of prostate cancer was AST/ALT ratio and age.

## DISCUSSION

Prostate cancer is the second most frequent cancer diagnosis made in men and the fifth leading cause of death worldwide.<sup>6</sup> Prostate cancer may be asymptomatic at the early stage and often has an indolent course that may require only active surveillance.<sup>7</sup> Based on GLOBOCAN 2018 estimates, 1,276,106 new cases of prostate cancer were reported worldwide in 2018, with higher prevalence in the developed countries. Differences in the incidence rates worldwide reflect differences in the use of diagnostic testing.<sup>8</sup> Prostate cancer incidence and mortality rates are strongly related to the age with the highest incidence being seen in elderly men (> 65 years of age). African-American men have the highest incidence rates and more aggressive type of prostate cancer compared to white men.<sup>9</sup> There is no evidence yet on how to prevent prostate cancer; however, it is possible to lower the risk by limiting high-fat foods, increasing the intake of vegetables and fruits and performing more exercise. Screening is highly recommended at age 45 for men with familial history and African-American men.<sup>10</sup> The present study was conducted to assess AST/ALT ratio as a significant predictor of the incidence risk of prostate cancer.

We found that there were 50 cases of PCa and 60 cases of BPH. The mean age was 6.5 years and 67.2 years, BMI (Kg/m<sup>2</sup>) was 24.1 and 24.6, diabetes was present in 6 and 8, CAD in 10 and 7 and hypertension in 23 and 25 in PCa and BPH patients. Zhou et al<sup>11</sup> investigated the effect of serum aspartate transaminase/alanine transaminase (AST/ALT) on the risk of prostate cancer. One hundred and ninety-four patients with prostatic cancer (PCa) were diagnosed by pathology. Two hundred and ten patients were diagnosed with benign prostatic hyperplasia (BPH). Multivariate logistic regression was used to analyze the effect of AST/ALT ratio and other factors on the incidence of PCa. Result: AST/ALT ratio was significantly higher in PCa than in BPH patients (OR 2.313, 95%CI 1.337-4.003, P = .002). ROC curve indicated that the best cutoff was 1.155 in predicting the incidence risk of PCa. The age of PCa patients is higher than BPH patients (OR 1.054, 95%CI 1.027-1.082)

We found that the mean PSA level <10 ng/ml was seen in 12 and 28, >10 ng/ml in 38 and 32, Gleason Score <6 was seen in 11, 7 in 15 and value 8 in 24, mean ALT(IU/L) was 20.1

and 21.6, AST(IU/L) was 20.6 and 19.8 and AST/ALT ratio was 1.14 and 1.21 in PCa and BPH patients respectively. We found that risk factors of prostate cancer was AST/ALT ratio and age. Kobayashi et al<sup>12</sup> aimed to evaluate the association between the aspartate aminotransferase (AST)/alanine aminotransferase (ALT) ratio and subsequent development of any type of cancer in an apparently healthy population. A total of 85,658 participants were included. The mean age was 44.7 years (standard deviation 12.0) at baseline, and 42,913 (50.1%) of them were men. During a median follow-up of 61.6 months, 4701 (5.5%) participants developed some type of cancer. Compared with the middle AST/ALT ratio group, no other groups had similar adjusted hazard ratios (HR) for the development of any type of cancer in both men and women. When stratified by alcohol consumption, very high (adjusted HR 1.36; 95% CI 1.13–1.63) and high (adjusted HR 1.26; 95% CI 1.05–1.50) AST/ALT ratio groups among men who were regular drinkers had increased adjusted HRs for any type of cancer development, but the very high AST/ALT ratio group among men who were abstainers (adjusted HR 0.64; 95% CI 0.42–0.97) and very low AST/ALT ratio group among men who were occasional drinkers (adjusted HR 0.69; 95% CI 0.48–0.98) had lower adjusted HRs compared with the middle AST/ALT ratio group. Among women, regardless of alcohol consumption, adjusted HR for any type of cancer development was similar across all AST/ALT ratio groups.

The limitation the study is small sample size.

## CONCLUSION

Authors found that AST/ALT ratio was an independent factor in predicting the incidence of PCa.

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