Correlation between Serum Prostate Specific Antigen and Prostate Volume in Nigerian Men with Biopsy Proven Benign Prostatic Hyperplasia: (A prospective study)

E Udeh, N Dakum, O Amu, V Ramyl

Citation

Abstract

Objectives: We studied the correlation between serum prostate specific antigen and the volume of prostate in Nigerian men with biopsy proven benign prostatic hyperplasiaPatients/Material and Methods: A total of 120 men with biopsy proven stromoglandular hyperplasia were included in the study. We analyzed PSA and total prostate volume (TV) measured by transabdominal ultrasound. We used Pearson correlation coefficient and linear regression model to describe the relationship between variables. RESULTS: The mean age of patients recruited for the study was 65.6years. The mean total prostate volume recorded in the study was 72.79mls ±44.38mls and mean PSA was 12.44±15.49ng/ml. Serum PSA level significantly correlated with TV (P<0.05). The Pearson correlation between PSA and TV was 0.3365 while that between age and PSA was 0.026. Conclusions: In Nigerian men with biopsy proven BPH the volume of the prostate significantly correlated with serum PSA. There was no significant correlation between age and PSA.

INTRODUCTION

Benign prostatic hyperplasia(BPH) is a common condition among men[1] and surgery for this condition is the second most common major operation for medicare in aged men (after cataract surgery)[2]. It is a pathological process that contributes to, but is not the only cause of lower urinary tract symptoms in ageing men.

Estimation of prostate volume may be useful in a variety of clinical settings. It is generally accepted though, that there is a minimal direct correlation between prostate volume and symptoms of BPH[3, 4]. Measurement of prostate volume is valuable in medical treatment of BPH as well; for example large prostates (total prostate volume more than 40mls) may respond better with 5 alpha reductase inhibitors while there is good clinical effect on smaller prostates with alpha blockers [5, 6]. Measurement of prostate volume though most accurate with trans- rectal ultrasound (TRUS); results from measurements done by transabdominal ultrasound correlate well with that of TRUS [7].

Additionally, prostate volume can help in the interpretation of serum prostate specific antigen[8]. Serum PSA has been shown to correlate with prostate volume among white men

without prostate cancer; thus nomograms for predicting prostate volume from serum PSA have been developed[9]. Moreover, some authorities suggest that PSA can be used to predict the therapeutic efficacy of treatment modalities for BPH on the grounds that PSA and prostate volume are correlated [10,11]. Most data on the correlation between PSA and prostate volume have been obtained from western populations. Unfortunately, very few studies have been done among African men; more so, with the findings in Japanese men that they release more PSA per unit prostate tissue than white men[12].It became imperative for us to carry out a prospective study to determine the correlation between PSA and prostate volume among Nigerian men.

PATIENTS, MATERIALS AND METHODS

This study was carried out in Jos University Teaching Hospital (JUTH), a tertiary health institution located in the heart of Jos the Plateau state capital. Plateau state is located in the central part of Northern Nigeria. This hospital receives referral for surgical and other health problems from Plateau state and neighboring states such as Nassarawa, Benue, Taraba, Adamawa, Bauchi, Gombe and Kaduna.

A total of 120 patients who were pathologically diagnosed

with BPH by transrectal trucut biopsy specimen of the prostate at the outpatient clinic of Jos University Teaching Hospital from 2006 to2008 were included in the study. The reasons for biopsy were increased PSA (>4ng/ml) or abnormal digital rectal examination. Those with biopsy evidence of prostate cancer, prostatitis, prostatic intraepithelial neoplasia or atypical small acinar proliferation detected at any point during follow up were excluded from the study. We also excluded those who have received any form of medical, minimally, invasive or open surgical treatments.

The total prostate volume was measured by a consultant radiologist using a transabdominal ultrasound (GE Logics Expert 052128 model). The total prostate volume was calculated using the formula V=□×□×□×π\6 (prolate ellipsoid formula). The PSA was determined by ELISA. Factors affecting PSA like trucut prostate biopsy, urinary tract infection, the use of finesteride, transurethral instrumentation and vigorous prostate digital examination were excluded.

RESULTS

As shown in Table 1, the mean age for the patients was 65.6±9.84 years. The maximum age of the patient enrolled for the study was 85 years. The maximum PSA value recorded in the study was 35ng/ml, though the mean PSA was 12.44±15.49 ng/ml. The maximum total prostate volume was 223.82mls. The correlation between age and PSA is 0.026 based on the Pearson's correlation co efficient (P>0.05) as shown in figure 1

The correlation between total prostate volume and PSA is 0.3365 based on the Pearson's correlation co efficient (P<0.05) as shown in figure 2.

Figure 1

Table 1: Descriptive statistics on all 120 patients

	MEAN±SD	RANGE
AGE(Years)	65.6±9.84	45-85
PSA(ng/ml)	12.44±15.49	3-35
Total prostate volume(mls)	72.79±44.38	14.83-223.82

Figure 2

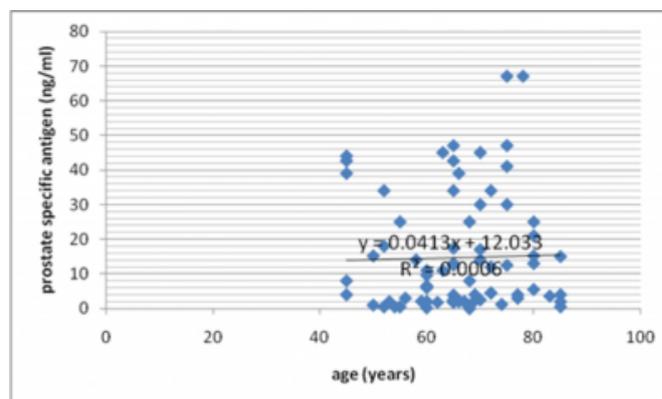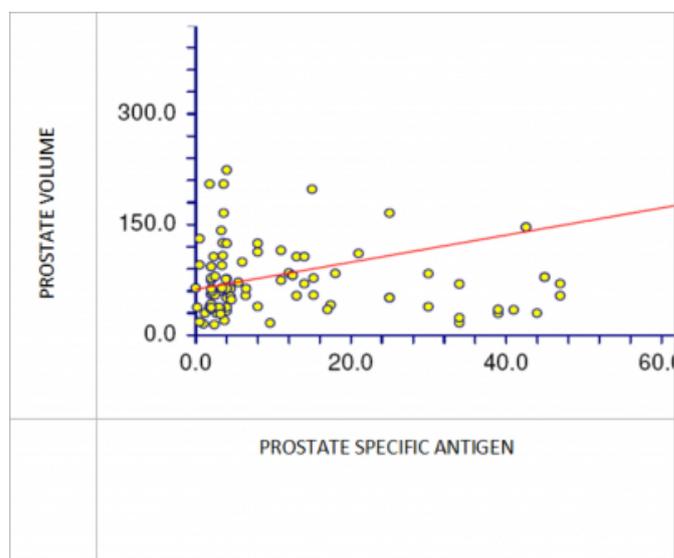Figure 1: Scatter plot of Age and PSA

Figure 3

Figure 2: Scatter plot of prostate volume and PSA

DISCUSSION

The pathophysiology of clinical BPH has been attributed to bladder outlet obstruction secondary to prostatic enlargement[13]. Imaging modalities have been applied in estimating prostate size however; PSA is usually evaluated in patients with BPH as further evaluation to determine those that would benefit from prostate biopsy.

This study determined the correlation between serum PSA and prostate volume in Nigerian men with biopsy proven benign prostatic hyperplasia. The value of the mean prostate volume (72.79±44.38mls) in this study differed from a similar study on determination of prostate volume done by Ibinaye[14] on Nigerian men (46.62±21.56mls). This difference may be attributed to numerical bias; more patients were enrolled in our study compared to theirs. However,

when compared to prostate volume values obtained in Europe and America in which a range of 30.3±9.8 to 49.0±26.9 was obtained[15], there was significant difference which could be explained by the late presentation of Africans to the clinic compared to the Caucasians. The mean PSA value compared to normal PSA range was elevated. This may be attributed to the mean prostate volume in this study which was high; since there is a correlation between PSA and prostate volume, the elevated mean PSA could be explained by this finding.

The study also showed that there was a statistically significant correlation between serum PSA and prostate volume in Nigerian men. This study agreed with the findings of Hochberg et al[16] which pointed out that in patients with BPH proven by TRUS biopsy, PSA and prostate volume had a statistically significant correlation.

In addition, there was no significant correlation between age and PSA in our study. This result differs from that obtained among caucascians[17]. The difference may be attributed to a selection bias. The age of our patients was not evenly distributed across the age range; about 42% of the patients were aged between 70-85 years old. The uneven age distribution may have accounted for the difference in statistical analysis. There is a possibility that if we had enrolled more patients who were older the correlation between age and PSA might have become significant. This finding although differed from that noted by Sang Eun Lee et al[18], agreed with what Yu-Lung Chang et al[17] observed in their study of Taiwanese men.

CONCLUSION

In Nigerian men with biopsy proven BPH, the volume of the prostate significantly correlated with serum PSA. There was no significant correlation between age and PSA. These findings agreed with that of Taiwanese men.

Furthermore, interpretation of serum PSA result in Nigerian men should be done with caution, since generally, they present with large prostate volume which may influence the value of the PSA.. When in doubt, a PSA density should be done and if it is elevated, a prostate biopsy should be done

References

1. Barry M J. Epidemiology and natural history of BPH. Urol Clin N. Amer 1990; 17:495-497.
2. Graves E J. Detailed diagnosis and procedures; National Hospital discharge survey: 1978; Nate centre for health statistics. Vital health statistics 1989; 13: 295-297 Chute C G, Guess H A, Danser L et al. The non relationship of urinary symptoms, prostate volume and uroflow in a population based sample of men. J Urol 1993; 149: 356-357.
3. Chute C G, Guess H A, Danser L et al. The non relationship of urinary symptoms, prostate volume and uroflow in a population based sample of men. J Urol 1993; 149: 356-357.
4. Barry M J, Cocket A T, Holtgrewe H L et al. Relationship of symptoms of prostatism to commonly used physiological and anatomic measures of the severity of BPH. J Urol 1993; 150: 351-358.
5. Boyle P, Gould A C, Roehrborn C G. Prostate volume predicts outcome of treatment of BPH with finesteride: Metaanalysis of randomized clinical trials. Urology 1996; 48:398-405.
6. Kurita Y. Transition zone ratio and prostate specific antigen density: the index of response of BPH to an alpha blocker. Int J Urol 1996; 3: 361-366.
7. Prassopoulos P, Charoulakis N, Anezinis P et al. Suprapubic versus transrectal ultrasonography in assessing the volume of the prostate and the transition zone in patients with BPH. Abdominal Imaging 1996; 21 (1):75-77.
8. Woodburne R. The Pelvis. In: Woodburne R T ed. Essentials in human anatomy. New York: Oxford University Press, 1978:156-170.
9. Roehrborn C. G, Boyle P, Gould A .C, Waidstreicher J. Serum PSA as a predictor of prostate volume in men with BPH. Urology 1999; 53: 581-589.
10. Roehrborn C .G, Boyle P, Bergner D: Serum prostate specific antigen and prostate volume predict long term changes in symptoms and flow rate: results of a four year randomized trial comparing finasteride versus placebo. Urology 1999; 54: 662-669.
11. Roehrborn C .G, Boyle P, Wickel J C: Efficacy and safety of a dual inhibitor of 5-alpha reductase types 1 and 2 (durasteride) in men with BPH. Urology 2002; 60: 433-441
12. Gupta A, Aragaki C, Gotoh M, Masumor N, Ohshima S, Tsukamoto T. Relationship between prostate specific antigen and indexes of prostate volume in Japanese men. Journal of Urology 2005; 173: 503.
13. Shapiro E, Lepor H. Pathophysiology of clinical benign prostatic hyperplasia. Urol. Clin. N. Amer 1995:22-23.
14. Ibinaye P O, Adeyinka A O, Obajimi M O. Comparative Evaluation of prostatic volume by transabdominal and transrectal ultrasonography in patients with prostatic hypertrophy in Ibadan. European journal of scientific research 2005; 10:1-2.
15. Roehrborn C, Fuh V, Ruane P et al. The relationship between total and free PSA, prostate volume and age in men age 40-60 yrs with no clinical diagnosis of BPH necessitating therapy. J Urol 2000; 163 (suppl): 252-254.
16. Hochberg, D. A., Armenakas, N. A. and Fracchia, J. A.: Relationship of prostate-specific antigen and prostate volume in patients with biopsy proven benign prostatic hyperplasia. Prostate, 45: 315, 2000
17. Roehrborn, C. G., Boyle, P., Gould, A. L. and Waldstreicher, J. Serum prostate-specific antigen as a predictor of prostate volume in men with benign prostatic hyperplasia. Urology, 53: 581, 1999
18. Sang Eun Lee, Jae Seung Chung, Byung Kyu Han, Ki Hyuk Moon, Sung Il Hwang,Hak Jong Lee, Gheeyoung Choe, Sung Kyu Hong.Relationship of prostate specific antigen and prostate volume in Korean men with biopsy proven benign prostatic hyperplasia.Urology 71: 395–398, 2008.
19. Yu-Lung Chang, Alex T. L. Lin,* Kuang-Kuo Chen, Yen-Hwa Chang, Howard H. H. Wu, Junne-Yih Kuo, William J. S. Huang, Shing-Hwa Lu, Yen-Shen Hsu, Hsiao-

Jen Chung, Shyh-Chyi Chang. Correlation between serum prostate specific antigen and prostate volume in Taiwanese men with biopsy proven Benign prostatic hyperplasia

Author Information

EI Udeh, FWACS

Enugu State University of Technology Teaching Hospital Park lane

NK Dakum, FWACS, FMCS

Jos University Teaching Hospital, Jos , Nigeria

OC Amu, FMCS

Enugu State University of Technology Teaching Hospital Park lane

VM Ramyl, FWACS, FMCS

Jos University Teaching Hospital, Jos , Nigeria