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Relationship of prostate volume and prostate-specific antigen levels in Sri Lankan men with Benign Prostatic Hyperplasia

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Abstract

Purpose: Benign Prostatic Hyperplasia (BPH) is an important cause of morbidity for ageing men worldwide. However, the available study is limited on the natural history of BPH and dynamics of Prostate-Specific Antigen (PSA) in Sri Lankan population. This study aimed to assess the relationship between serums Prostate Specific Antigen (PSA), prostate volume (PV), and PSA density (PSAD) and to evaluate variations of above parameters with aging and to assess the mean prostate volume of Sri Lankan men with Benign Prostatic Hyperplasia (BPH).

Material and methods: This was a retrospective study, men diagnosed with Benign Prostatic Hyperplasia from January 2009 was evaluated. This study was approved by the Ethics Review Committee of Colombo South Teaching Hospital and the patient informed written consent was received. Those with UTI, PSA >10ng/dl and suspicious prostate in digital rectal examination (DRE) were excluded from the study. Data were statistically analyzed to determine the relationship of PSA, PV, PSAD and variations with age groups.

Results: This study recruited a total number of 562 men, clustered into 5 age groups and their mean Prostate Volume (PV) was 42.9 (12.56SD). The median PSA was 2.5ng/dl with an inter quartile range of 0.37. The mean PSA density (PSA/PV) was 0.11 (0.023SD). The tendency towards increase in PSA and prostate volume with increasing age showed statistical significance ($P<0.05$). PSA density was not changed much between different age group except 51-60 age group. It is noted PSAD was fluctuating around mean PSAD of 0.11 in majority of the age groups.

Conclusion: PV and PSA increase with age. Mean PV is relatively small compare to blacks and Caucasians. .PSA density in Sri Lankan men is comparable to published data in other countries and could be used as a surrogate marker to evaluate the prostate and for therapeutic decision making.

Keywords: Prostate; Benign Prostatic Hyperplasia; Prostate Volume; Prostate-Specific Antigen; Prostate-Specific Antigen Density

1. Introduction

Benign Prostatic Hyperplasia (BPH) is a common health issue among ageing men globally [1]. It is evident that BPH is a progressive disease that significantly affects the quality of life nearly one third of men older than 50 years. BPH is histologically obvious in up to 90% of men by age 85 years and over 30 million men have symptoms related to BPH worldwide. However, very little is known about the natural history of BPH and dynamics of Prostate-Specific Antigen

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(PSA) in Sri Lankan population. Prostate malignancy is the commonest cancer in men and the second-leading cause of death in men after lung cancer. At early stages, prostatic cancer is usually asymptomatic and late diagnosis is common and it is associated with high morbidity and mortality [2]. One of the tests that has always been used for early detection and screening of prostate cancer is measuring the serum level of PSA, which despite all the limitations of its sensitivity and specificity, is the most commonly used method along with the physical examination [3].

The serum PSA level and PV of patients with BPH has a log-linear relationship that increases proportionally with age. The older the man the greater the PV and serum level of PSA increases as the prostate volume increases [4]. The PSA density can be used as a surrogate marker to evaluate BPH and its progression and it is useful in therapeutic decision making such as prostate biopsy although there are several communities and clinic based longitudinal studies from the Western world regarding differences in PSA and prostate volumes, such data are not available in Sri Lankan men with BPH [5]. There is a need to further evaluate on this in Sri Lankan men for better understanding of its natural history. Therefore the aim of the study is to assess relationship between serum PSA, PSA density and prostate volume and to evaluate variations in different age groups and also to assess mean prostate volume of BPH prostates.

2. Material and methods

This was a retrospective study 562 men diagnosed with BPH from January 2009 were evaluated. The exclusion criteria for the study were expanded to patients who had UTI, PSA >10ng/dl, abnormal Digital Rectal Examination and past history of Trans Urethral Resection of Prostate. Information was abstracted from medical records including demographics and clinical data. Approval for using data from medical records was obtained from the Ethical Review Committee, Colombo South Teaching Hospital under the provision that no personal identifiers be recorded. These data were entered into an electronic database for analysis. Data were statistically analyzed to determine the relationship of PSA to prostate volume and variations with age groups. The data were analyzed using SPSS software version 26.

3. Results

The recruited study participants were clustered into 5 age groups and their mean Prostate Volume (PV) was 42.9 (12.56SD). The median PSA was 2.5ng/dl with an inter quartile range of 0.37. The mean PSA density (PSA/PV) was 0.11 (0.023SD).Variation of PV, PSA and PSAD with different age groups were summarized in Table 1. More patients with BPH were noted in 71-80 age group (37%) and 61-70 age group (30%). Mean prostatic volume was rising with ageing as expected (Figure I). With the rise in prostate volume PSA was noted to increase with age except in 70 to 80 years age group (Figure 2) this is likely due to sampling error.

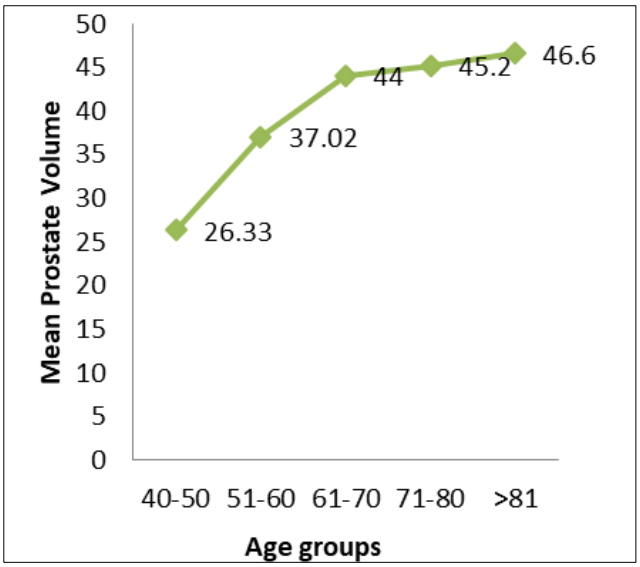

Figure 1 Variations of Mean Prostate Volume with different age group

The tendency towards increase in PSA and prostate volume with increasing age showed statistical significance (P<0.05). PSA density was not changed much between different age group except 51-60 age group. It is noted PSAD was fluctuating around mean PSAD of 0.11 in majority of the age groups (Figure 3).

Table 1 Prostate Specific Antigen and Prostate Specific Antigen Density with different age groups

Age (years)	Prostate Volume(PV) (Mean and SD)	Prostate Specific Antigen (PSA) (Median and IQR)	PSA Density (PSAD) (Mean and SD)
40-50	26.33(10.52)	1.08(0.347)	0.12(0.01)
51-60	37.02(12.35)	1.75 (0.3)	0.07(0.01)
61-70	44.0 (12.33)	2.8 (0.4)	0.11(0.02)
71-80	45.2(12.95)	2.6(0.4)	0.13(0.03)
>81	46.6(13.33)	4.3(0.49)	0.1 1(0.08)

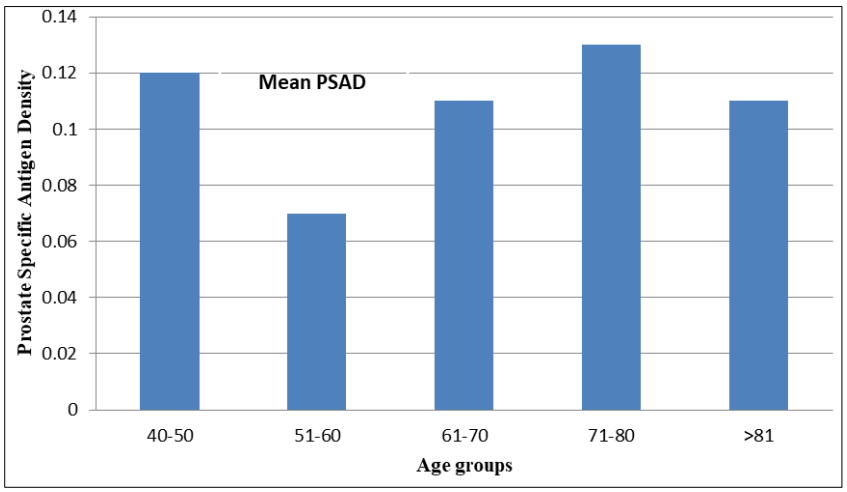

Figure 2 Variations of Prostate Specific Antigen Density with different age groups

4. Discussion

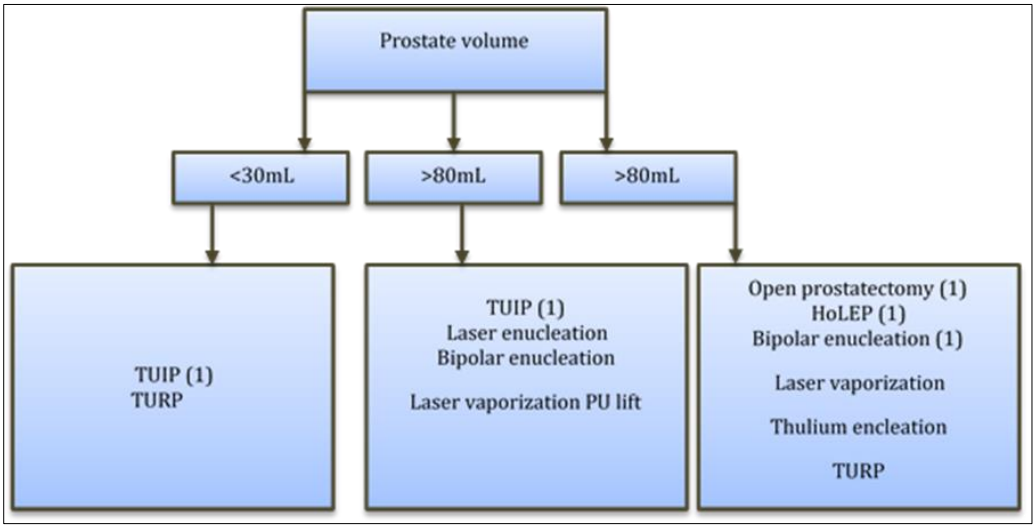

Figure 3 Surgical treatment choices according to the prostate size (EAU guidelines)

There are several studies confirming a correlation between prostate volumes and ageing [6]. In this study, the mean prostate volume of Sri Lankan men is gradually increasing with age and this is comparable with the data published in other studies. There are several studies confirming the relationship between PSA and ageing [7]. In this study, the PSA

of Sri Lankan men is increasing with age and this is comparable with the data published in other studies. In this study, the values of PSAD of Sri Lankan men were fluctuating around 0.11(mean PSAD) in different age groups and it did not show a gradual linear increase with ageing. A study done in healthy Iranian men confirmed that PSAD was age-dependent [8,9] and this is not comparable with the results of this study.

The choice of the surgical technique depends on prostate size. Figure 3 illustrates surgical treatment choices according to the prostate size. When compared to countries like USA, European countries and Africa, prostate volume of Sri Lankan men is relatively small in size with mean prostate volume 42.9ml [10]. This indicates that medically resistant lower urinary tract symptoms (LUTS) and BPH with complications such as obstructive uropathy, bladder stone, refractory urine retention and recurrent UTI can be managed with Monopolar or Bipolar TURP rather than managing with other advanced, costly interventions such as Holmium laser enucleating (HoELP) or more morbid surgeries like open prostatectomy.

5. Conclusion

Prostate volume and PSA in Sri Lankan men increase with ageing and it is comparable to published data in other countries. PSAD in Sri Lankan men did not show a linear increase with ageing and it is not comparable to the published data in other countries. PSAD of Sri Lankan men are comparable to studies from Japan and Iran. Mean prostate size in BPH patients in our population was comparable to Japan and Iranian studies and indicates relatively smaller prostate compared to Caucasians and blacks. As we know, as prostate size is essential in decision making of prostate surgery, majority of our patients can be treated with TURP rather than costly, advanced options like HoLEP.

Compliance with ethical standards

Disclosure of conflict of interest

There is absolutely no conflict of interest between the authors as everybody is aware of the work and participated adequately.

Statement of informed consent

This study obtained informed consent from all individual participants included in the study.

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