



CORRELATION OF PROSTATE VOLUME AND PROSTATE SPECIFIC ANTIGEN WITH AGE IN NORTH INDIAN POPULATION

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ABSTRACT

Purpose: Cancer is a major public health problem worldwide. Prostate carcinoma is the most common form of cancer in elderly male and is the second leading cause of cancer deaths. Prostate volume (PV) varies throughout man's lifetime, and in the course of different prostatic diseases, including benign prostatic hyperplasia (BPH). The prostate volume strongly predicts BPH-related outcomes, such as symptom progression, acute urinary retention (AUR), and the need for BPH-related surgery. The serum PSA increases with age. The relationship between age-related increases in prostate volume and serum PSA has been studied, mostly in efforts to increase the usefulness of PSA level in screening for prostate cancer.

Material and Methods: The present study was performed on 100 patients in the age group of 40- 80 years. Transrectal ultrasonography was performed using a 7.5 MHz transrectal probe. Prostate volume and transitional zone volume (TZV) were calculated with the help of inbuilt software, by measuring 3 dimensions of prostate in transverse and longitudinal sections. PSA estimation was done with 2ml of blood sample by tPSA Elisa method. The kit used for this method was of CALBIO TECH.

Results: It was seen that in the lower age group the prostate size was smaller, while in the higher age group it was higher ($p > 0.001$). Mean prostate size was found to be 20.92 ± 2.57 gm which was in 40-49 years age group. This shows a significant difference in mean size of prostate in different age groups. Mean serum PSA levels 0.19-5.93 ng/ml. The mean value was found to be minimum in age group 40-49 years. Total of 11 patients had serum PSA level above 4 ng/ml.

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INTRODUCTION

The advent of the modern era of medicine has blessed humans with an increase in their life expectancy. The diseases of elderly population contribute to a large group of patients in OPD. Cancer is a major public health problem worldwide and is the second leading cause of death in the United States. In African-American population, the incidence rates are higher in Africans when compared to the White men, with 158.3 new cases diagnosed per 100,000 men. The mortality rate of Africans is approximately twice as high as White men[1]. The reason for this disparity has been hypothesized to be differences in social, environmental and genetic factors. Although 2,293,818 new cases are estimated until 2040, a small variation in mortality will be observed[2].

The prostate gland lies between the bladder neck and the urogenital diaphragm, just anterior to the rectum, an ideal position to be imaged via TRUS. The gland is traditionally described based on a pathologic zonal architecture. These divisions consist of the anterior fibromuscular stroma that is devoid of glandular tissue, transition zone, central zone, periurethral zone, and peripheral zone. The prostate is further divided into apex and base (directed upward to the inferior border of the bladder[3]).

Prostate volume (PV) varies widely throughout man's lifetime. It also increases in the course of different prostatic diseases, including benign prostatic hyperplasia (BPH)[4,5]. Benign prostatic hyperplasia (BPH) has been a considerable health problem to aging men for its associated symptoms and complications. Although BPH is not a life-threatening condition it has a negative impact on a mens quality of life and it is evidenced in many community and clinical studies. Risk factor for progression of disease is considered to be aging [5]. Many studies have revealed a characteristic pattern of human

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prostatic growth with age[6]. Age-adjusted incidence rates of prostate cancer have increased dramatically. Prostate volume is an important parameter used by treating clinicians to manage patients with lower urinary tract symptoms (LUTS) or cancer. The increase in prostate volume with age is correlated with the development of benign prostatic hyperplasia (BPH), which can potentially obstruct the bladder outlet, and it needs interventions. [7]. Measurement of Prostate volume also guides surgeons to decide on drug treatments or optimal surgical modalities to resect enough prostatic tissue to relieve or improve LUTS.

Prostate volume is also very useful in diagnosis of prostate cancer and management as it can be used in conjunction with serum prostatic specific antigen (PSA) a relevant parameter for decision-making [8]. The measurement of volume of the prostate is also useful in radiation oncology. Hence, estimating the actual prostate volume with accuracy is very important for proper medical and surgical management of prostatic diseases as well as for ablative procedures[9]. Ultrasonography, and more specifically transrectal ultrasonography (TRUS), is the most commonly used tool to estimate prostate volume [10]. Many prostate cancers are detected on the basis of elevated levels of prostate-specific antigen (PSA > 4 ng/mL). Relationship between age-related increase in prostate volume and serum PSA has been studied extensively in an effort to increase the usefulness of PSA level in screening for prostate cancer. [11]. The present study is undertaken with the aim to assess PV and serum PSA levels in the North Indian population in different age groups.

MATERIAL AND METHODS

This study was carried out in Department of Anatomy in collaboration with Department of Surgery and Department of Radiology Era University, Lucknow. This was a prospective observational study. Nature of study was hospital based cross sectional study. Present study was performed on 100 patients. The age of the patients varied from 40-80 years.

All the adult male patients above 40 years of age with the history of lower urinary tract symptoms were included in the study. Patients who had not given consent, with bleeding disorder and systemic illness were excluded. All the patients were subjected to history taking, clinical examination, DRE, PSA estimation, Transrectal ultrasonography Study was approved by institutional ethical committee

Ultrasonography

Transrectal ultrasonography was performed using 7.5 MHz transrectal probe. Prostate volume and transitional zone volume (TZV) were calculated with the help of inbuilt software, by measuring 3 dimensions of prostate in transverse and longitudinal sections.

PSA estimation (Prostate Specific Antigen)

PSA estimation was done with 2ml of blood sample by tPSA Elisa method. The kit used for this method was of CALBIO TECH.

Statistical Analysis

The data was analyzed using statistical package for social sciences version 15.0. Intergroup comparison for mean values was made using ANOVA. The confidence limit was 95%

hence a “p” value less than 0.05 indicated statistically significant difference.

OBSERVATION AND RESULTS

Table I Agewise Distribution (n=100)

S.bNo	Age group	No of patients	Percentage
1	40-49	12	12
2	50-59	24	24
3	60-69	34	34
4	70-79	30	30

Maximum number of patients 34% were between 60-69 years

Table II Comparison of prostate size with age

Age group (in Years)	No of patients	Mean Prostate size(gms)	SD
40-49	12	20.92	2.57
50-59	24	31.75	3.76
60-69	34	59.15	9.35
70-79	30	64.93	8.45
Total	100	49.72	18.26

p<0.001

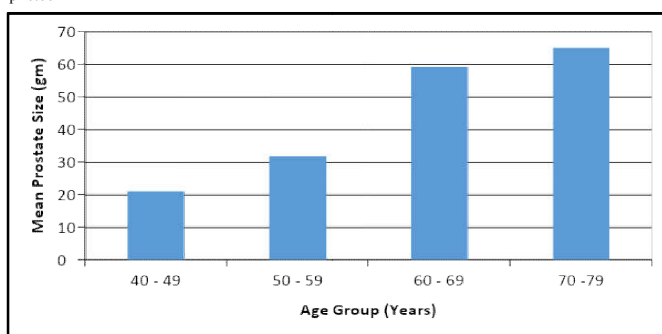


Figure 1 Correlation of mean prostate size and age group

Mean prostate size in 40-49 years was found to be 20.92+ 2.57 gm (range 18-25gms). In the age of 50-59 years it was 31.75 + 3.76 gm (range 26-40 gm). In the age group of 60-69 it was found to be 59.15+ 9.35 gm (range 41-70 gm). Size of the prostate in 70-79 years was found to be 64.93+ 8.45 gm. This shows a significant difference in mean size of prostate in different age groups. It was seen that in the lower age group the prostate size was smaller while in the higher age group it was higher (p>0.001)

Table III Comparison of PSA level in different age groups

Age group in years	No of patients	Mean PSA level ng/ml	SD	Range
40-49	12	0.54	0.23	0.24-0.97
50-59	24	1.04	0.37	0.19-1.78
60-69	34	2.70	0.74	0.94-4.30
70-79	30	3.37	1.29	0.54-5.93
Total	100	2.24	1.37	0.19-5.93

p < 0.001

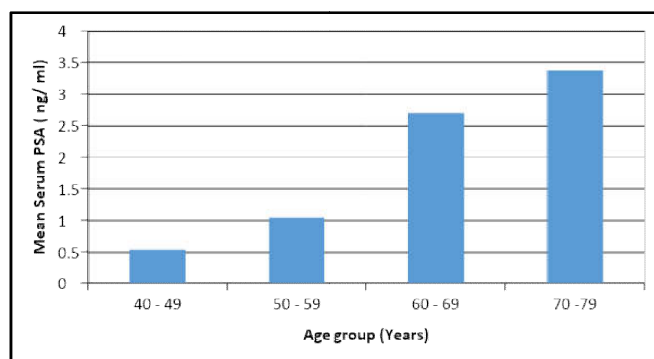


Figure 2 Correlation of mean Serum PSA and Age group

Mean serum PSA levels 0.19-5.93 ng/ml. The mean value was found to be minimum in age group 40-49 years. total of 11 patients had serum PSA level above 4 ng/ml

DISCUSSION

Early attempts to measure prostatic volume by digital rectal examination (DRE) alone are now replaced by more accurate measurement with transrectal ultrasound (TRUS) and it showed excellent results [12], TRUS remains the main method applied routinely in the clinic to assess prostate volumes [13]. Other non-ionising imaging methods such as magnetic resonance imaging (MRI) are expensive and not easily available [14,15]. Cheah NL, Roehrborn CG. Both PV and serum prostate-specific antigen (PSA) predicts the progression of disease and response to medical therapy in patients with BPH, it also guide in selecting the regimen for medical treatment: Boyle P Therefore, PV and PSA is an important tool to understand the course of prostatic diseases, and it is also a criteria to diagnose and making decision regarding therapy.

In our study volume of prostate in less than 50 years of age was found to be 20.92 gm with SD 2.57 which is less than the PV measured by Deori *et al.* In their study the PV in this age group was 23.8-30cc. Deori *et al* reported that the maximum number of patients in their study was in the age group of 60-70 years and their PV was 43cc (range 23.8-143cc). In the present study maximum number of patients was also between 60-70 years of age but the PV was calculated as 59.15 (SD-9.35) which is much higher than Deori *et al.* [16]

Gupta *et al* [17] studied the PV in Japanese men in the age group of 43-89 years with mean age of 67.1 years and reported the prostate volume 30.2cc which is much lower than the present study.

Veseley *et al* [18] measured the volume of prostate in the population of Europe in the age group of 45-91 men (mean age 70.2) and reported as 40.1cc

The prostate gland produces and secretes an alkaline fluid, which energizes and protects the sperm during ejaculation. Commonly the prostate changes and enlarges with increasing age. [19] Jemal A, Siegel

Age is one of the key factors for prostate disease. With age susceptibility towards the disease too increases [5]. Serum PSA was found to be elevated with age and was clearly shown in various studies conducted among Asian populations such as Chinese, south Indians, Koreans, Singaporeans, and Japanese Roehrborn CG McConnell JD AUA Practice [20]

In our study the serum PSA in the age group 40-80 years range from 0.54-2.24 ng/ml. Liu *et al* [21] studied the PSA in Chinese population in the 40-70 years of age and reported the range 2.15 to 5.37 ng/ml. The result of the present study was much lower than the range reported in Chinese population.

Mehrabi *et al* [22] reported the range of serum PSA in Iranian population 1.35-4.4ng/ml which is higher than the present study.

In the present study it is observed that the serum PSA increases with age which is in accordance with the studies done in China and Iranian men.

Aditi gupta *et al* [23] in their study done on healthy Indian male patients also reported the increase in the serum PSA level with age which also match with the present study. There is a significant difference in mean size of prostate in different age groups. It was seen that in the lower age groups the prostate size was smaller. While in the higher age group its size was larger ($P < 0.001$). The prostate volume and serum prostate antigen increases with age and the serum PSA increases due to increase in prostate volume. We also observed that serum PSA level also increases with age. A total of 11 patients had serum PSA levels more than 4 ng/ml

CONCLUSION

In men no of factors like age, prostate volume (PV) and serum prostate specific antigen (PSA) determine the natural course of prostatic disease and the course which has been well studied. The aim of screening is to detect certain diseases at an earlier stage. This reduces the mortality rate and improves the quality of life. The mortality rate of Prostatic carcinoma can be decreased if the disease is diagnosed early when it is confined to one organ. The data provided by this study will be helpful in further research.

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