Study of age related morphological change of the prostate gland in Bangladeshi male cadaver

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Abstract

The prostate is a fibromuscular glandular organ which secrets a thin milky fluid that form the bulk of the semen, it also enhances the motility of the sperm that is important for successful fertilization of the ovum. Size and shape of this organ changes over times and usually increases more in later stage of life. The object of the study was to find out the age related changes of prostate directly by measuring volume of the prostate in male cadaver in our country.

It was a descriptive type of study. The study was carried out in the Department of Anatomy of Sir Salimullah Medical College (SSMC), Dhaka from July 2009 to December 2010. The present study was performed on 60 cadaveric (postmortem) human prostate of Bangladeshi male in different age groups. Among the studied samples, the lowest age was 10 years and the highest age was 70 years. The samples were collected, age ranging from 10-70 years and divided into three age groups; group A (10-18years), group B (19-45 years) and group C (46-70 years). The mean volume of the prostate was 3.11 ± 1.64 cm^3 in group A (10-18years), 8.76 ± 1.83 cm^3 in group B (19-45 years), 14.38 ± 2.40 cm^3 in group C (46-70 years). The differences of volume of the prostate was highly significant (P<0.001) between A vs B, A vs C and B vs C. In this study, it was observed that there was significant change in volume of prostate in relation to age which in turn reflects similar findings found all over the world. The study is more accurate as the volume of the prostate was measured directly by removing the organ from the cadaver.

Key Words: Morphological change, prostate gland, Bangladeshi male cadaver

Introduction

The prostate means before to stand (Gk.pro=before, istania=to stand)[1].The prostate gland is a cone-shaped mass of glandular tissue about the size of a chestnut. It surrounds the first part of the urethra, known as the prostatic urethra. The prostate gland is surrounded by a thin fibrous capsule and a layer of smooth muscle[2]. It is a pyramidal fibromusculo glandular organ[3]. The space between the true and false capsule is occupied by the prostatic venous plexus. In no circumstances, this venous plexus should be disturbed for if it is injured, a severe bleeding will follow[4].

Outside the true capsule lies a condensation of connective tissue separated from the capsule by less dense tissue; this outer layer is sometimes called the false capsule of the prostate[5].

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The prostatic urethra merges with the ejaculatory ducts and at this point angle forwards. Prostate consists of four zones of unequal size: Transitional zone comprises about 5% of the glandular tissue. It surrounds the proximal segment of the prostatic urethra. Central zone (20%) surrounds the ejaculatory ducts. Peripheral zone approximately (70%) makes the maximum bulk of the gland. Anterior fibro muscular stroma contains no glandular tissue and lies anteriorly[6].

The associated mesenchyme differentiates into the dense stroma and smooth muscle of the prostate[7,8]. In the male, these buds form the prostate gland[9].

Pathological processes in the prostate gland occur commonly in association with aging and include inflammation, atrophy, hyperplasia, intraepithelial neoplasia and carcinoma. Prevalence of benign enlargement of the prostate is 14% in 40-50 years old men, which increase to approximately 40% for men older than 60 years[10].

Materials and Methods

The present study was performed on postmortem (cadaveric) human prostates of Bangladeshi males of different age groups. The samples of human prostates were collected from the unclaimed dead bodies autopsied in the department of Forensic Medicine of Sir Salimullah Medical College (SSMC) and Dhaka Medical College (DMC), after fulfilling requisite legal formalities. The collection was done within 12 to 36 hours of death before showing any signs of putrefaction. Before collection of samples appropriate age, sex, cause of death, time and date of

collection were recorded from morgue's record book. Collected sample was brought to the Department of Anatomy, Sir Salimullah Medical College (SSMC).Then each sample was gently washed in running tap water to remove the blood and blood clots as far as possible. The sample were tagged immediately, which beared an identification number. After that the sample was fixed in 10% formol saline solution. Further study was done on fixed sample.

Table 1: Age distribution in different study groups. n=60

Study group	Age range (in years)	No of samples	Percentage
A	10-18	11	18.33
B	19-45	33	55
C	46-70	16	26.66

Parameter studied
Measurement of the volume of the prostate.

Procedure of measurement of the volume of the prostate
Volume of the prostate was measured by ellipsoid formula in which three prostatic dimensions were required. In the axial plane, the transverse and antero-posterior dimension were measured at the widest transverse dimension. The longitudinal dimension was measured in the sagittal plane by slide callipers. Then the formula was applied:

Volume= Height x Width x Length x 0.52 [11].

For all the above mentioned variables, the measurements were taken thrice for each variable and the average value was calculated by simple arithmetic mean. The measurement was done by the researcher herself.

The volume was expressed in mean with standard deviation (SD) and comparison among the different age groups was made using ANOVA. The SPSS version11.0 was used.
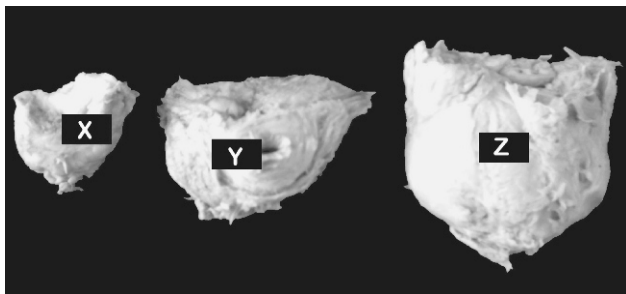

Fig. 1: Photograph showing the prostate of three age groups.

group A (10 to 18 years) represented by - X
group B (19 to 45 years) represented by - Y
group C (46 to 70 years) represented by - Z

Table 2: Volume of the prostate in different age groups n=60
Group A: Age 10-18 years

Groups n	Volume (cm^3) Mean±SD
A 11	3.11±1.64 (1.24-5.70)
B 33	8.76±1.83 (6.24-14.39)
C 16	14.38±2.40 (10.30-19.63)
Groups	*P value*
A vs B	<0.001[***]
A vs C	<0.001[***]
B vs C	<0.001[***]

Group B: Age 19-45 years

Group C: Age 46-70 years

[Figures in parentheses indicate range]

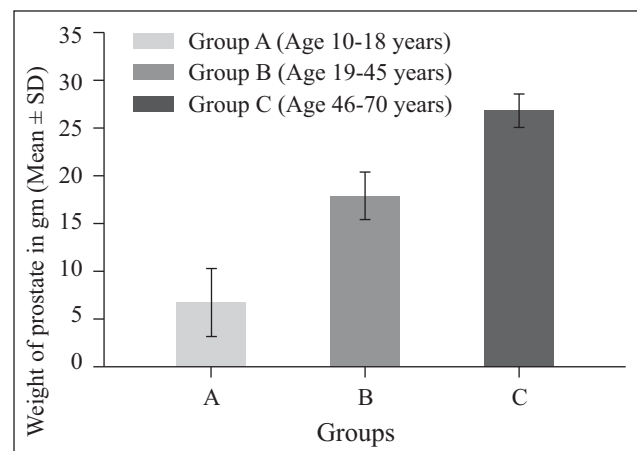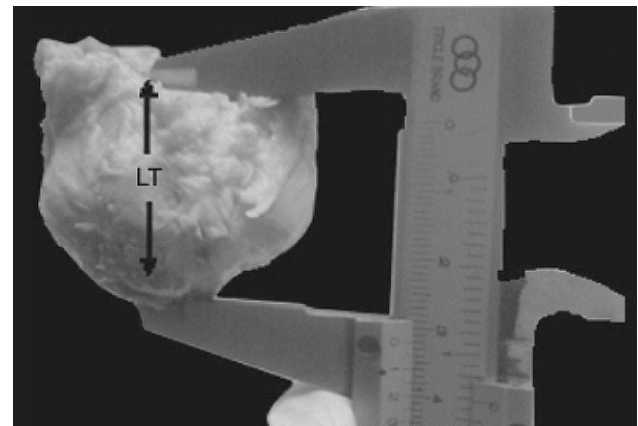**Fig. 2:** Relationship between age and volume of the prostate

Fig. 3: Volume of the prostate in different age groups

Discussion

The highest mean volume of the prostate was 14.38 ± 2.40 cm^3 in group C and the lowest was 3.11 ± 1.64 cm^3 in group A. The values were highly significant (P<0.001) when compared between the groups. The volume showed positive correlation with age(r =+0.899, P<0.001) which was highly significant. The findings of the present study agreed with Ahmed (2007). The racial factors might be responsible for the similar values. This statement was lower than those reported by Gearhart et al. (1993), Zackrisson et al. (2000). They all studied by transrectal ultrasound examination. The different method used by them might be responsible for the lower values.

Gearhart, Yang, Leonard, Jeffs, Zerhouni (1993) studied on 13 prostate of Maryland people age ranging from 19 to 38 years observed that the mean prostatic volume was 20.7 ± 8.2 cc^{12}.

Zackrisson, Hugosson and Aus (2000) studied on 125 healthy male prostate of Sweden age ranging from 20 to 69 years stated that the mean prostatic volume in (20-29) age group was 19.2 ± 4 cm^3, in (30-39) age group was 21.7 ± 5.1 cm^3, in (40-49) age group was 25.7 ± 5.4 cm^3, in (50-59) age group was 33.7 ± 20.1 cm^3 and in (60-69) age group was 35.5 ± 12.5 cm^{13}.

Ahmed (2007) studied on 70 prostates of Bangladeshi people age ranging from 10 to 70 years. She reported that the mean prostatic volume was 7.68 cm^3 in group A (10-20years), 10.61 cm^3 in group B (21-40years) and 15.40 cm^3 in group C (41-70years)[14].

Conclusion

There were changes in the morphology and histomorphology of the prostate gland in relation to age. To establish a standard data for the volume of the prostate gland in Bangladeshi people, further studies are necessary with larger sample size from different age groups.

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