Transretal Ultrasonographic Assessment of Prostate Volume in Normal Adult Nigerians

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ABSTRACT

Objective: To establish a nomogram of prostate volumes in normal adult Nigerians as a guide to determine the mean prostate volume in normal adult Nigerians.

Patients and Methods: Two hundred men whose ages range from 25 to 45 years (mean age 35 years) with no symptoms of prostatic enlargement consented to be screened by transrectal ultrasound (TRUS). The prostate volumes were calculated using the three dimensional formular Ð/6 x length x width x height and the mean volume reported.

Result: The mean prostatic volume for a normal adult Nigerian obtained is 20.93 ± 1.79cm^3 compared with 19.80cm^3 for the Caucasians. A strong positive correlation between prostate volume and age ($r = 0.734$, $p<0.05$) is also noted.

Conclusion: A nomogram of prostate volume in normal adult Nigerian has been obtained by this study. The mean prostatic volume for adult Nigerians was noted to be 20.93 ± 1.79cm^3. This was different from the value for Caucasians which is 19.80 cm^3 though not statistically significant.

Keywords: Transrectal ultrasonography, prostate volume, Nigerians.

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INTRODUCTION:

Transrectal ultrasonography (TRUS) was first applied by Watanabe[1] in 1967 to image the prostate. Ever since its introduction, the image quality and the role of TRUS has increased significantly. TRUS currently provides the most accurate and cost effective means of measuring prostate volume and can also demonstrate the zonal anatomy of the prostate.[2,3] According to McNeal's concept of zonal anatomy of the prostate,[4] the major site for the development of benign prostatic hyperplasia (BPH) and prostatic cancer are the transition zone (TZ) and the peripheral zone (PZ). TRUS can also be used for assessment of prostatitis, hemospermia, male infertility and staging of prostate cancer.[5,6]

There is presently no nomogram of prostate volumes for normal adult Nigerians. The values currently in use for clinical evaluation of prostatic diseases are based on Caucasian population. This study therefore aims to provide a nomogram of prostate volume in normal adult Nigerians between the ages of 25 – 45 years. It will also provide the mean prostatic volume for normal adult Nigerians in the locality under study.

MATERIALS AND METHODS

Within the period of the study (12 months) two hundred male subjects whose ages range from 25–45 years (mean age 35 yrs) with no history or symptoms of prostatic enlargement consented to be screened by transrectal ultrasound (TRUS). Digital Rectal Examination (DRE) was earlier performed by a clinician to exclude any palpable mass and any prostate glands with abnormal echotexture during sonography were also excluded.

The prostate dimensions were determined sonographically using Kretz Combison (model) 310A medical ultrasound scanner unit manufactured by – Kretz Combison. The unit has 7.5 MHz transrectal biplane transducer and is also equipped with a versatile electronic calliper system.

The TRUS technique was explained to each subject prior to investigation. Acoustic gel was first applied on the probe before it was covered with the commercially available disposable latex.

The subjects were examined in left lateral decubitis position. The prostate was first examined systematically from bladder neck to the apex in the axial plane. The largest antero-posterior (height) and transverse (width) diameters were measured. In the sagittal plane, the longest cranio-caudal diameter from the bladder neck to the apex of the prostate was measured as the length. The prostate volume was then calculated using the three dimensional formula according to Terris and Stanmey.[7] A minimum number of six subjects were measured for each age group. The relationship between prostate volume and age was determined using Pearson's correlation analysis.

RESULTS

The mean prostatic volume for each age group was obtained by taking the average prostatic volume of the subjects in that age bracket. The result is shown in Table 1.

Age (Year) Vol.	No. of Subjects	TRUS Prostrate cm3
25	6	18.30\f
26	10	18.31
27	6	18.35
28	14	18.40
29	18	20.51
30	8	22.53
31	12	19.70
32	6	19.90
33	8	20.05
34	14	20.17
35	6	20.42
36	12	21.22
37	8	21.45
38	8	22.11
39	10	22.29
40	14	22.30
41	12	22.34
42	10	22.38
43	10	22.50
44	8	23.05
45	10	23.40
Mean for all ages cm3 ± 1.79		20.93

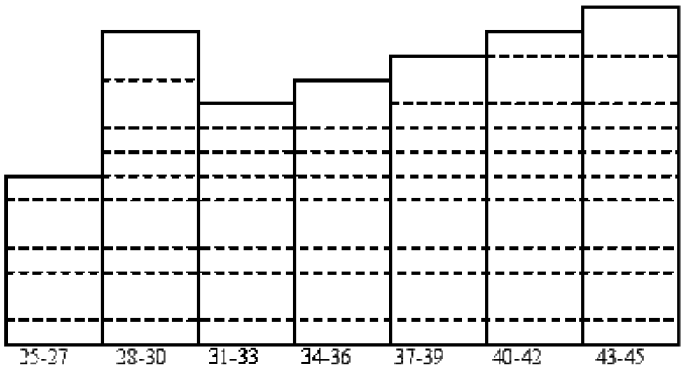

Fig. 1: Histogram showing the postrate volume against subject age for TRUS

DISCUSSION

Accurate estimation of the prostate volume has the advantages of providing a reliable prostate volume which will be used to derive prostate specific antigen (PSA) index and PSA divergence to predict the probability of cancer of the prostate[8] and more accurately distinguish benign, premalignant and malignant prostatic diseases.[9] A precise estimate of the extent of prostatic enlargement would help to decide on the appropriate therapy.[10] An estimate of the decrease in prostate volume after hormonal manipulation or radiotherapy is used as an indication of therapeutic efficacy.[11, 12]

In this study, prostate volume was calculated for different age groups using TRUS. The mean prostate volume in normal adult Nigerians was shown to be 20.93 ± 1.79cm^3 though this value is at variance with the value for the Caucasians (19.80cm^3) [13] it is not statistically significant (P>0.5). The prostate volume correlated significantly with the age of the subjects (r = 0.734). This is in agreement with literature that the prostate gland enlarges with age in men. Previous study by Witjes et al[8] further supports this finding. Our results also show that between ages of 20–30 years, the prostate volume appeared to have greater marginal increase in volume. No apparent cause was attributable to this variance. The researchers suggest the possible increased demand on the prostate gland from hyper sexual activity at this age range to be a possible cause.

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