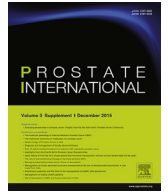




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Original Article

Studying the effect of type 2 diabetes mellitus on prostate-related parameters: A prospective single institutional study

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ABSTRACT

Background: To examine the effects of type 2 diabetes mellitus (DM) on the variables associated with prostatic growth including serum prostate-specific antigen (PSA), serum testosterone, and prostate volume, and to correlate these variables with the duration of diabetes treatment.

Materials and methods: Our study was conducted over 3 months recruiting 501 men aged ≥ 55 years; of whom 207 had type 2 DM. Exclusion criteria were active urinary tract infection, suspicious rectal examination, urologic cancer, end-organ damage, and recent urological manipulations. Serum PSA and serum testosterone were measured. Prostate volume was determined by abdominal ultrasonography using an ellipsoid formula.

Results: The mean patient age was 60.21 ± 5.95 years. The mean PSA, testosterone, and prostate volume for diabetic men were 2.3 ng/mL, 3 ng/mL, and 56 g, respectively. The corresponding values for nondiabetic men were 3.5 ng/mL, 4 ng/mL, and 51 g, respectively ($P = 0.001$, $P = 0.001$, $P = 0.03$, respectively). The mean PSA density was 0.049 ± 0.043 ng/mL/cm³ in diabetics versus 0.080 ± 0.056 ng/mL/cm³ in non-diabetics ($P < 0.001$).

Conclusion: Type 2 DM is significantly associated with lower serum PSA and testosterone, and larger prostate volume.

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1. Introduction

Diabetes mellitus (DM) is a serious problem in male health. A positive association exists between clinical markers of benign prostatic hyperplasia (BPH) and DM.^{1,2} Subnormal serum free testosterone is detected in diabetic men.³ Kasper et al suggested an inverse correlation between DM and the risk of prostate cancer.⁴

The aim of this work was to determine the effects of type 2 DM on serum total prostate-specific antigen (PSA), serum total testosterone, and prostate volume.

2. Materials and methods

The study was prospectively conducted over 3 months and recruited male patients aged ≥ 55 years who presented to our hospital with different benign urological conditions. The study included 501 men and 207 of them had type 2 DM. Exclusion

criteria were patients with active urinary tract infection, urological cancer, end-organ damage, abnormal digital rectal examination findings, and recent urological manipulations.

This study was approved by the ethical committee of our institution and informed consent was obtained from participating patients.

All men were subjected to detailed history taking and physical examination. Body mass index was calculated. Six milliliters of venous blood were drawn at 8:00 AM, then serum was separated and stored at -20°C . Serum PSA and testosterone were assessed using electro-chemiluminescence immunoassay. Prostate size was calculated using abdominal ultrasonography. The ellipsoid formula was applied.

Data were analyzed using SPSS version 18.0 (SPSS, IBM Corporation, Chicago, IL, USA). The P value was assumed to be significant at ≤ 0.05 .

3. Results

The mean age of patients was 60.21 ± 5.95 years (55.0–93.0 years). For diabetic patients, the mean PSA, testosterone, and prostate volume were 2.3 ng/mL, 3 ng/mL, and 56 g, respectively.

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Table 1

Comparison between the two studied groups according to PSA, testosterone, prostate volume, PSA density, and BMI

Variable		Diabetics (207)	Nondiabetics (294)	P value
PSA		2.3 ± 1.5	3.5 ± 1.9	0.001
PSA	< 4	179 (86.5%)	193 (65.6%)	< 0.0001
	> 4	28 (13.5%)	101 (34.4%)	
Testosterone		3 ± 1.8	4 ± 2.1	0.001
Prostate volume		56 ± 18	51 ± 23	0.03
PSA density		0.05 ± 0.04	0.08 ± 0.05	0.001
BMI		32.23 ± 5.04	29.32 ± 4.20	0.001

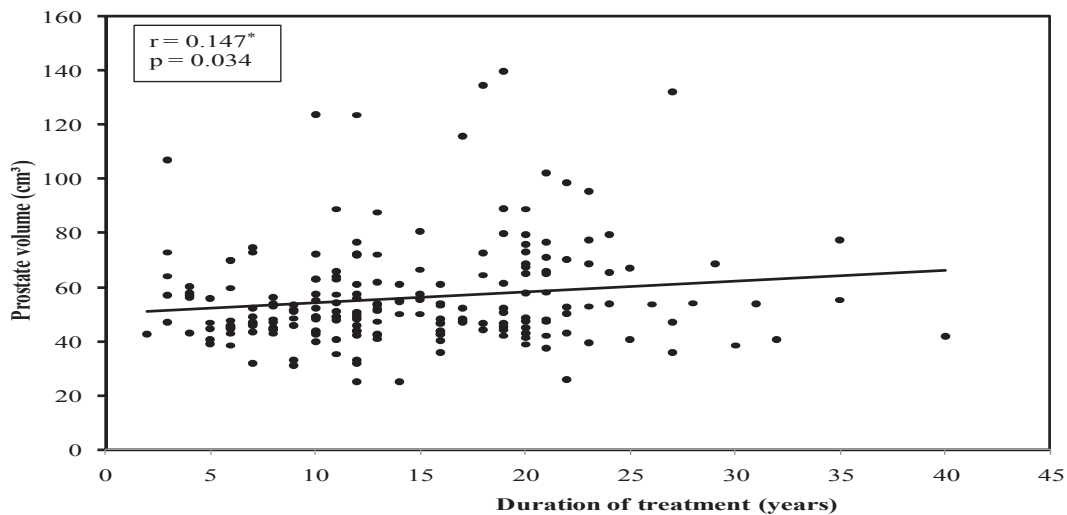
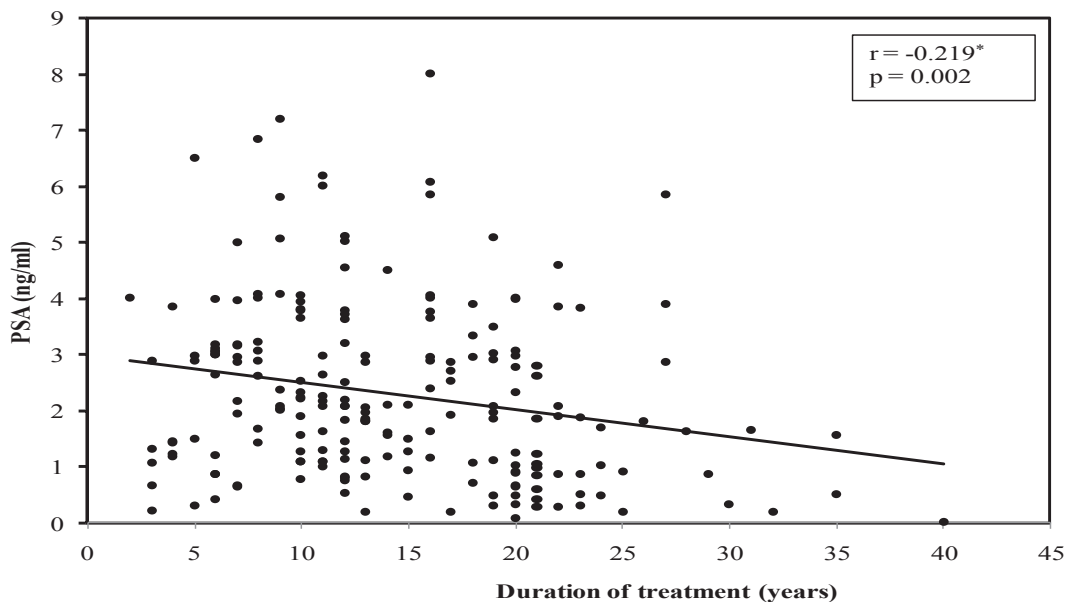
BMI, body mass index; PSA, prostate-specific antigen.

The corresponding values for nondiabetic individuals were 3.5 ng/mL, 4 ng/mL and 51 g, respectively. The mean body mass index (BMI) was 32.23 ± 5.04 and 29.32 ± 4.20 for diabetic patients and nondiabetic individuals, respectively (Table 1).

There was a significant positive correlation between duration of treatment of DM and mean prostate volume ($r = 0.147$, $P = 0.034$) (Fig. 1), while significant negative correlations were found between

duration of DM treatment and mean serum PSA values ($r = -0.219$, $P = 0.002$) (Fig. 2), mean serum testosterone values ($r = -0.221$, $P = 0.001$) (Fig. 3), and mean PSA density values ($r = -0.203$, $P = 0.003$) (Fig. 4).

High BMI in diabetic patients was a confounding factor, therefore, multiple regression analysis was done, confirming the true significant correlation of DM with the studied parameters (Table 2).

**Fig. 1.** Correlation between duration of treatment of diabetes mellitus with prostate volume in diabetic group.**Fig. 2.** Correlation between duration of treatment of diabetes mellitus with PSA in diabetic group. PSA, prostate-specific antigen.

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