

Prevalence of prostate cancer among Turkish men with prostate-specific antigen level of ≤ 100 ng/ml

ABSTRACT

Aim of Study: Prostate cancer (PCa) is one of the most common cancers among men and has become a significant health problem in developing and developed countries. Prostate-specific antigen (PSA) is a useful marker for screening and monitoring the patients. In this study, the author aimed to detect the prevalence of PCa among Turkish patients who underwent prostate biopsy with PSA level of <100 ng/ml.

Materials and Methods: The patients who underwent prostate biopsy between January 2008 and January 2015 were reviewed retrospectively. The clinical data that include age, PSA level, and biopsy results were recorded. The patients were divided into five groups according to the PSA levels; ≤ 4 , 4.01–10, 10.01–20, 20.01–50, and 50.01–100 ng/ml.

Results: There were 1609 patients in this study. Of these patients; 181, 914, 345, 129, and 40 patients had a PSA level of ≤ 4 , 4.01–10, 10.01–20, 20.01–50, and 50.01–100 ng/ml, respectively. The patients' ages and PSA levels were between 40 and 89 years with a median of 62 ± 8.32 years and between 0.3 and 100 ng/ml with a median of 7.40 ± 12.97 ng/ml. PCa prevalence increased from 13.25% to 82.5% in the patients with a PSA level of ≤ 4 and 50.01–100 ng/ml.

Conclusion: Western populations have more common PCa than Asian men. The studies showed the PCa prevalence for Turkish men was higher than Asian and less than Western origins. Prevalence of PCa was increased with PSA level rising, and this prevalence is between Western and Asian origin similar in the literature.

KEY WORDS: Biopsy, prevalence, prostate cancer, prostate-specific antigen

INTRODUCTION

Prostate cancer (PCa) is the second most common cancer in the world, and there will be 1.7 million new cases throughout the world by 2030.^[1] Prostate-specific antigen (PSA) is a useful biomarker to detect PCa and risk classification in patients with organ confined and metastatic diseases.^[2] Historically, PSA was approved by the USA Food and Drug Administration in 1986 to monitor PCa patients and for cancer detection in 1994.^[3] D'Amico risk classification is the most widely used classification that includes PSA level, Gleason score, and clinical T-stage to predict the prognosis.^[4] In this classification, PSA level was divided into three categories as <10 , 10–20, and >20 ng/ml. The patients with a PSA level about 10 ng/ml have more advanced disease and worse prognosis comparing the patients with a PSA level near 0 ng/ml. On the contrary, some studies reported that the patients who

were diagnosed PCa with low PSA levels were more likely to have advanced disease, distant metastasis, and worse PCa-specific survival than their counterparts with higher PSA levels.^[5–8]

Aging, ethnicity, and family history of PCa are the main well-established risk factors of the disease.^[9] The PCa incidence rate is 4–7/100,000 in Asia and Africa, whereas this rate is increased to 70–100/100,000 in Nordic European countries and North America.^[10] The authors reported the overall age-adjusted incidence rate of PCa was 35/100,000 in Turkey. The aim of this study is to detect the prevalence of PCa among the Turkish patients who underwent transrectal ultrasound-guided prostate biopsy with different PSA levels.

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MATERIALS AND METHODS

The patients, who underwent transrectal ultrasound-guided prostate biopsy between January 2008 and January 2015, were analyzed retrospectively. Age, PSA level, and biopsy results were recorded. The patient who had PSA level more than 100 ng/ml and absence of clinical data were excluded from the study. The patients were divided into five groups according to the PSA levels; ≤ 4 ng/ml (Group 1), 4.01–10 ng/ml (Group 2), 10.01–20 ng/ml (Group 3), 20.01–50 ng/ml (Group 4), and 50.01–100 ng/ml (Group 5). The prostate biopsy indications were abnormal digital examination and/or more than 4 ng/ml of PSA levels. Age-related PSA cutoff was not used in this study. High-grade PCa (HGPCa) was defined ≥ 7 Gleason score at prostate biopsy. The eight-core prostate biopsy was performed between the 2008 and 2011 years. After 2011, the minimal twelve cores of prostate biopsy were done for the patients. All patients underwent for prostate biopsy in lateral decubitus position with transrectal ultrasound-guided under local anesthesia.

Two urogenital pathologists evaluated the biopsy specimens, and Gleason score was used for the grade of cancer. The data were expressed as mean \pm standard deviation using MedCalc Statistical Software version 16.2.0 (MedCalc Software bvba, Ostend, Belgium; <https://www.medcalc.org>; 2016).

RESULTS

During the study period, 1985 prostate biopsies were done in our hospital. About 1609 of these patients met the criteria of the protocol. There were 181, 914, 345, 129, and 40 patients in Group 1, 2, 3, 4, and 5, respectively. The patients' ages and PSA levels were between 40 and 89 years with a median of 62 ± 8.32 years and between 0.3 and 100 ng/ml with a median of 7.40 ± 12.97 ng/ml [Table 1].

The diagnosis of the patients was granulomatous prostatitis in three patients (0.18%), prostate intraepithelial neoplasia in 12 patients (0.74%), atypical small acinar proliferation in 54 patients (3.35%), PCa in 450 patients (27.96%), and benign prostate hyperplasia in 1090 patients (67.74%). Table 2 shows the diagnosis of the patients in groups. PCa prevalence increased from 13.25% to 60.94% in the patients with a PSA level of 20.01–100 ng/ml.

Gleason 6 was the most common pattern of PCa with an incidence of 54.88% of the patients. Gleason 10 was reported in four patients (0.88%). The other patients were

diagnosed as Gleason 7 in 132 patients (29.33%), Gleason 8 in 34 patients (7.55%), and Gleason 9 in 33 patients (7.53%). The Gleason score of the patients in groups is shown in Figure 1.

DISCUSSION

PSA is a serine protease member of the human kallikrein family and produced by normal and malign prostate tissues.^[2] PSA is secreted into seminal fluid for to liquefy semen from its gel form. Serum PSA levels increase in diseases such as PCa, benign prostate hyperplasia, acute or chronic prostatitis, and manipulations of the prostate (massage, biopsy, and resection of the prostate tissue). Other screening tools for evidence of PCa are digital rectal examination (DRE) and transrectal ultrasonography.^[11] Abnormal DRE and/or increased PSA levels are the indications of prostate biopsy.^[12] The prostate biopsy can be performed with transrectal or transperineal approaches.^[11] Transrectal ultrasound-guided biopsy is the most common procedure for PCa detection; transperineal prostate biopsy is less common. Since the introduction of sextant transrectal biopsy, it is accepted routinely performed technique for PCa diagnosis and extended, saturation biopsy protocols are reported to enhance cancer detection rate.^[13]

The prevalence of PCa among non-Western populations is less common than Western countries.^[1] Turkey looks like a bridge between Europe and Asia.^[14] The authors reported the PCa incidence was 13.8/100,000 in İzmir/Turkey between 1998 and 2002; while relatively lower rates compared to European countries and 2 and 3 times higher rates were reported in Asian countries.^[15] Another study from Turkey, the investigators reported the overall age-adjusted incidence rate of PCa was

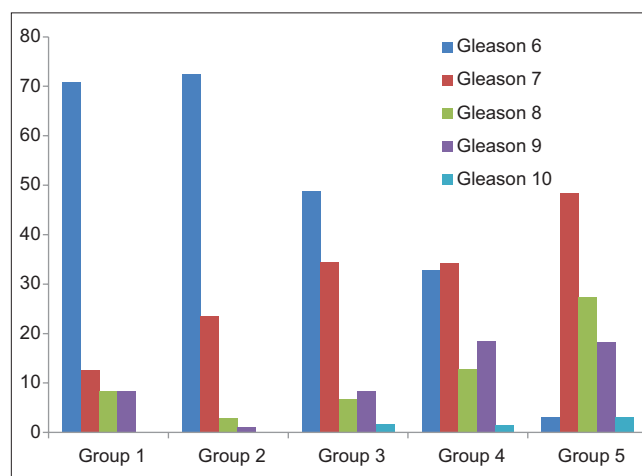


Figure 1: Gleason score of the patients in each group

Table 1: The clinical data of the patients

	Total	Group 1	Group 2	Group 3	Group 4	Group 5
Age, years	62 \pm 8.32	58 \pm 8.03	61 \pm 7.83	65 \pm 8.7	65 \pm 7.92	69 \pm 9.89
PSA level, ng/ml	7.40 \pm 12.97	3.1 \pm 1	6.30 \pm 1.60	13.10 \pm 2.69	29.2 \pm 7.95	74.8 \pm 16.2
fPSA/PSA	0.18 \pm 0.09	0.2 \pm 0.008	0.18 \pm 0.09	0.16 \pm 0.10	0.13 \pm 0.10	0.11 \pm 0.13

PSA=Prostate-specific antigen, fPSA=Free prostate-specific antigen

Table 2: Pathological reports of the patients

	Total	Group 1	Group 2	Group 3	Group 4	Group 5
n (%)	1609 (100)	181 (100)	914 (100)	345 (100)	129 (100)	40 (100)
PCa	450 (27.97)	24 (13.25)	204 (22.31)	119 (34.49)	70 (54.26)	33 (82.5)
BPH	1090 (67.74)	150 (82.87)	670 (73.30)	207 (60)	56 (43.41)	7 (17.5)
ASAP	54 (3.35)	5 (2.76)	34 (3.72)	14 (4.05)	1 (0.77)	
PIN	12 (0.74)	2 (1.10)	5 (0.54)	4 (1.15)	1 (0.77)	
Granulomatous prostatitis	3 (0.18)		1 (0.1)	1 (0.29)	1 (0.77)	
HGPCa, n (%)	203 (12.69)	7 (3.86)	56 (6.12)	61 (17.68)	47 (36.43)	32 (80)

PCa=Prostate cancer, BPH=Benign prostate hyperplasia, PIN=Prostatic intraepithelial neoplasia, ASAP=Atypical small acinar proliferation, HGPCa=High-grade prostate cancer

35/100,000 between 2008 and 2009.^[10] GLOBOCAN 2012 data showed the incidence of PCa among East Asian men were 10.5/100,000.^[16] The surveillance, epidemiology, and end results found the PCa incidence was 186.1, 918.5 and 831.3/100,000 in the age of 40–64, 65–74, and >75 years between 2002 and 2006 in the USA.^[17] This incidence rates of PCa in the ages of 40–64, 65–74, and 75+ years were reported 143, 870.2 and 1216.9 in Finland between 2002 and 2006 years. In Saudi Arabia, age-standardized incidence rate of PCa was reported 7.7/100,000.^[18]

The incidence of PCa is increasing because of widespread use of PSA screening with early stage of the disease.^[19] Systematic prostate biopsy protocols with PSA level of 2–4 ng/ml have reported the PCa detection rate was approximately 25%. The authors reported the incidence of PCa was 23.6% in the PSA level of 2–4 and 4.1–10 ng/ml among the Japanese population.^[19] The detection rate of PCa was 15.22% and 8.6% in the study of Thompson *et al.*^[20] and Teoh *et al.*^[12] among the patients with PSA level of <4 ng/ml and normal DRE. The cancer detection rate was 11% and 15.2% regardless of DRE in the Chinese population with a PSA level of <4 and 4–10 ng/ml;^[12] Catalona *et al.*^[21] reported the PCa detection was 20.7% and 40.8% with normal and abnormal DRE for PSA level of 4.1–9.9 ng/ml. In this study, the author found that the PCa prevalence was 13.25% and 23.31% among the Turkish men with PSA level of ≤4 and 4.01–10 ng/ml. The prevalence of PCa is higher than Chinese population and lower than Western population.

The PCa prevalence of the patients with PSA level 10–20 has been reported variety results in the literature. The authors reported the prevalence was 21.8%^[12] and the other study found was 25.58% among the Chinese men.^[22] Koo and Shim^[23] reported the detection rate of PCa was 29.2% of the Korean patients with PSA above 10 ng/ml. Uçar *et al.*^[24] analyzed the Turkish patients and found the PCa rate was 40.22% of the patients with PSA level of 10.1–20 ng/ml. The present study showed the detection of PCa was 34.49% of the Turkish men with PSA level of 10.01–20 ng/ml. This rate was less than the study of Uçar *et al.* and higher than the Asian population.

The detection rate of PCa was 59.6% for Chinese men,^[12] but in the another study, the investigators reported that PCa consisted the 35.63% of the Chinese patients with PSA level of 20–50 ng/ml.^[22] The authors reported the PCa prevalence

was 73.6%, 90.3%, and 93.8% for the patients with PSA level of 20–29.9, 30–39.9, and 40–49.9 ng/ml.^[25] In addition, the authors reported the PCa detection rate was 98.5% when PSA level was increased to 50 ng/ml. Another study showed the PCa prevalence of Singaporean men with PSA level of >20 ng/ml was 72.3%; unfortunately, upper limit of PSA was unclear in the study.^[26] In the current study, the prevalence of PCa was found as 54.26% and 82.5% among Turkish men with PSA level of 20.01–50 and 50.01–100 ng/ml.

HGPCa is defined ≥ Gleason 7 at prostate biopsy. The authors reported the Gleason score ≤6 in 47.4%, 7 in 13.4%, and ≥8 in 38.9% of the patients with PSA level of 10–50 ng/ml.^[22] Another study that includes Singaporean men, HGPCa was reported as 4.8%, 10.8%, 27.9%, and 69.4% of the patients with PSA level of 0–3.99, 4–9.99, 10–19.99, and ≥20 ng/ml.^[24] Our study showed the HGPCa prevalence was 3.86%, 6.12%, 17.68%, 36.43%, and 80% of the patients with PSA level of 0–4, 4.01–10, 10.01–20, 20.01–50, and 50.01–100 ng/ml, respectively, and Gleason score 6 was the most common pattern of the patients with PSA ≤20 ng/ml. In the other groups, Gleason 7 consists 34.28% and 48.48% of the patients, respectively.

There are some limitations in this study. This is retrospective in nature. All of the data were obtained from single center without different geographical area. There is no data of prostate weight, DRE results, and family history of PCa which affect the biopsy result. Although these limitations, to the best of my knowledge, this the first study of PCa prevalence among Turkish men with different PSA levels including large number of patients in the literature.

CONCLUSION

This study showed the similar findings in the literature. The PCa prevalence of Turkish people is less more than Western and higher than Asian people. Further studies that include a large number of patients are needed to define the prevalence of PCa among Turkish men.

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Conflicts of interest

There are no conflicts of interest.

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