

ORIGINAL ARTICLE

PSA measurement in a self - selected population

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Abstract

Introduction and objectives: PSA measurement is used in both mass and opportunistic prostate cancer screening while most guidelines recommend informed decision making about whether to undergo screening and PSA testing. Unfortunately, patients' attitude towards screening and knowledge of the pros and cons of the test has not been thoroughly assessed. The purpose of this study is to review the patient demographic characteristics and PSA distribution in a self - selected population of men taking advantage of a free PSA measurement during the 2014 Prostate Cancer Awareness Week.

Materials and Methods: The study comprised 4,453 men presenting for the free PSA test. All men provided unconditionally data of their demographics, history of lower urinary tract symptoms (LUTS) and history of their last PSA measurement and previous urological examination.

Results: The offer of a free PSA test attracted a total of 4,453 men. Men's age ranged from 37 to 91 years (mean 57.1 ± 8.9 yrs). The majority was between 50 and 70 yrs while 24.7% were <50 yrs and 7.6% >70 yrs. PSA ranged

from 0.01 to 109.4 ng/mL (mean 1.38 ± 2.31 ng/mL). Depending on the cut - off value (≥ 2.5 , ≥ 3.0 or ≥ 4.0 ng/mL), a subsequent diagnostic evaluation (probable prostate biopsy) could be indicated in 13.5%, 9.8%, and 5.4% of the men comprising our study group, accordingly. PSA was measured for the first time in 27.9% of the study population.

Conclusions: Although our study is not a cross - sectional one, it shows a favorable attitude of the Greek male population towards PSA testing since 72.1% of participants reported having a PSA test in the past. Free PSA testing attracts younger people than those participating in large, mass screening studies as well as a certain proportion of men undergoing testing without being appropriate candidates for screening according to contemporary guidelines. Although offering free prostate screening is a successful method of reaching men who might otherwise not be tested, parameters of men's knowledge, attitudes, and health beliefs and behaviors should be further exploited.

Key words

Prostatic specific antigen;
screening;
self - selected population

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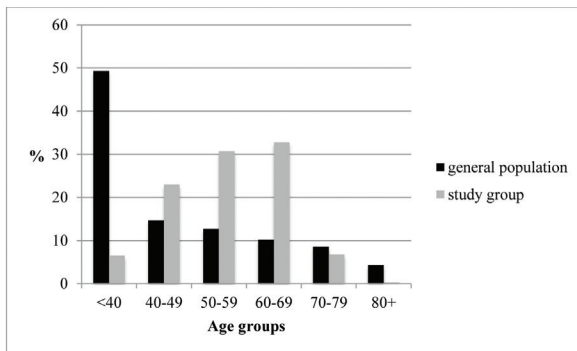


Figure 1: Distribution of age groups in our cohort (bars in gray); bars in black represent the distribution of the corresponding age groups in the population of males in Greece (Hellenic Statistical Authority, 2011 population census)

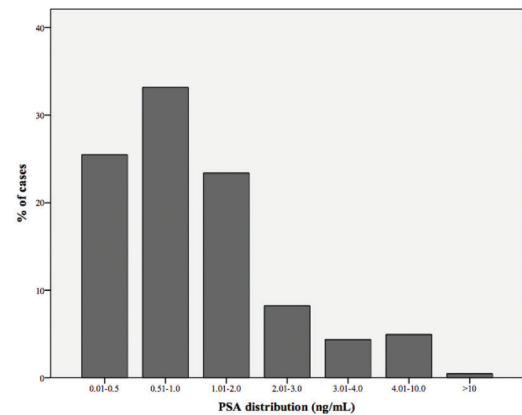


Figure 2: PSA distribution in the study group

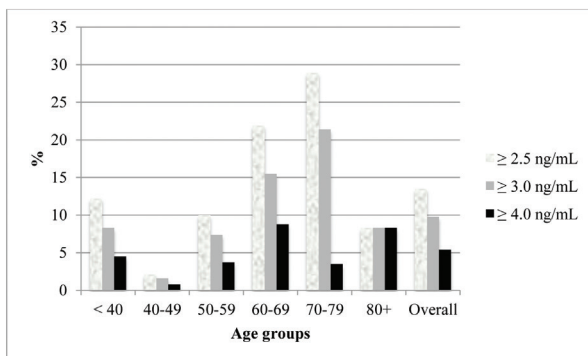


Figure 3: Percentage of cases with PSA levels exceeding 2.5, 3.0, and 4.0 ng/mL

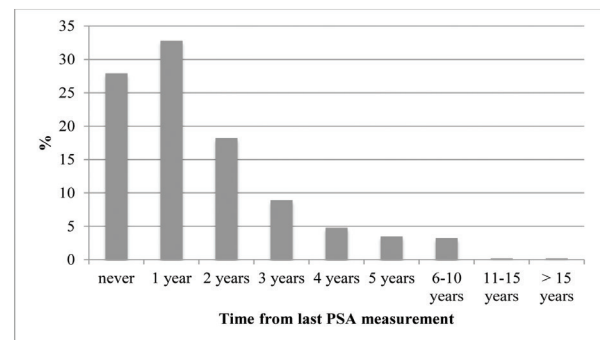


Figure 4: Distribution of study attendees by time from last PSA measurement

Introduction

The prostate - specific antigen (PSA) test is a simple blood test measuring a natural protein produced by the prostate. Although mass and opportunistic prostate cancer screening with PSA is widespread¹⁻³, PSA testing remains controversial. While it may lead to the detection of cancers at an earlier stage and a modest reduction of prostate cancer mortality⁴, it also carries a substantial risk for over - diagnosis and over - treatment⁵. As a result, most professional guidelines recommend an informed decision making for prostate cancer screening with PSA⁶. However, recent studies show low level of patient - provider communication⁷ and variable effectiveness of decision aids for decision - making in clinical or community settings⁸. A community - or a nation - based intervention to promote informed decision making for prostate cancer screening with PSA should take into consideration patient, physician and system barriers. The annual Prostate Cancer Awareness Week is a form of such

an intervention giving the opportunity to assess the characteristics of those who take a PSA test on their own initiative.

Materials and Methods

In 2014, a privately owned diagnostic laboratory offered a free PSA test during the Prostate Cancer Awareness Week. The offer was publicized through newspaper and television advertisements. All men assessed agreed to provide a brief urologic history including prior PSA screening. Men with known prostate cancer were excluded. Blood samples were analyzed using the Advia Centaur immunoassay system (Siemens, Germany). A spreadsheet containing all available information omitting patients' identification was then donated to the Hellenic Urological Association -the sponsor of Prostate Cancer Awareness Week - for further analysis and optimal exploitation. Analyses were conducted with SPSS software (Version 21.0).

TABLE 1

Age specific mean PSA levels for US, European and Greek men without known prostate cancer

Estimated mean PSA, ng/mL (95% CI)				
Age	NHANES*	Greek cohort	ERSPC**	PLCO
40 - 44	0.84 (0.75 - 0.92)	0.74 (0.68 - 0.81)		
45 - 49	1.00 (0.81 - 1.20)	0.81 (0.70 - 0.92)		
50 - 54	1.59 (1.08 - 2.09)	1.08 (0.98 - 1.19)		
55 - 59	1.30 (1.02 - 1.57)	1.34 (1.23 - 1.46)	1.28 to 1.70	1.64
60 - 64	1.49 (1.28 - 1.70)	1.63 (1.51 - 1.76)	1.75 to 2.87	1.80
65 - 69	1.89 (1.35 - 2.44)	1.86 (1.71 - 2.00)	2.48 to 3.06	2.18
70 - 74	2.37 (1.94 - 2.79)	2.41 (1.63 - 3.16)		
75 - 79	3.66 (2.87 - 4.43)	2.52 (1.37 - 3.67)		
80+	4.04 (3.05 - 5.03)	3.21 (1.29 - 7.71)		
Overall	1.56 (1.37 - 1.74)	1.39 (1.31 - 1.46)	1.7 to 3.3	1.90

*NHANES, National Health and Nutrition Examination Survey, **minimum and maximum values for different centers

Results

The offer of a free PSA test attracted a total of 4,453 men. Although the test was by guidelines recommendation offered to men aged 50 to 75, men under and over that age range were also assessed. Men's age ranged from 37 to 91 years (mean 57.1 ± 8.9 yrs). The majority was between 50 and 70 yrs while 24.7% were <50 yrs and 7.6% >70 yrs (Figure 1). PSA ranged from 0.01 to 109.4 ng/mL (mean 1.38 ± 2.31 ng/mL). PSA distribution within the study cohort as well as by age group is shown in Table 1 and Figure 2. Although quite slight, mean PSA value increased significantly ($p < 0.001$) by age with significant variations within the 70 to 74 and 80 to 84 age groups.

Depending on the cut - off value (≥ 2.5 , ≥ 3.0 or ≥ 4.0 ng/mL), a subsequent diagnostic evaluation (probable prostate biopsy) could be indicated in 13.5%, 9.8%, and 5.4% of the men comprising our study group, accordingly. Cases with PSA levels exceeding the cut - off values mentioned above were identified along all age groups (Figure 3).

Based on participants' statement, PSA was measured for the first time in 27.9% of the study population. The rest of them had a PSA measurement in the past 1 to 15 years (Figure 4).

Discussion

Community - based free prostate cancer screening programs have helped in overcoming, among others, the financial constraints that could hinder seeking screening^{9,10}. Prostate cancer awareness week during which prostate carcinoma screening with digital rectal examination and PSA testing is provided free or at low cost has become the largest screening program in USA since its inception in 1989 and has contributed to the early detection of prostate carcinoma and a shift in stage of disease at diagnosis¹¹. The rates of PSA testing to detect prostate cancer vary significantly across countries. A USA population survey reported that 41% of men aged 50 or older reported having had a PSA test within the past year¹². In Australia a cross sectional survey reported that 67% of family practice attendees aged 40 or older recalled having a PSA test in the past five years¹³. In comparison, in the United Kingdom, only 6% of men aged 45 - 89 in the family practice setting undergo testing each year¹⁴. Data as such are not available in Greece. Although our study is not a cross sectional survey, it may suggest a favorable attitude of the Greek male population towards PSA testing since 72.1% of our study participants reported having had a PSA test in the past. This is comparable to the percent-


age (72%) reported by those attending the East Harlem Partnership for Cancer Awareness free screening program¹⁰.

Patient characteristics including PSA kinetics and mean PSA values by age group are available only from large mass screening programs or community - based studies^{15,16}. Mean age at entry was 60 yrs (range, 55 - 69) for the ERSPC (European Randomized Screening for Prostate Cancer) and 63.5 yrs (range, 55 - 74) for the PLCO (Prostate, Lung, Colorectal and Ovary cancer) trial¹⁵. Similarly, the mean age of those who accepted - upon invitation - to participate at the ProtecT (Prostate Testing for Cancer and Treatment) study in the United Kingdom was 62.3±4.8 (range, 50 - 70 yrs)¹⁷. Likewise, the mean age of the whites participating in the 1993 and 1994 Prostate Cancer Awareness Week was 61.4 yrs (range, 40 - 79 yrs)¹⁶. However, age of those attending other free prostate cancer screening programs seems to be different: ages spanned from 40 to 68 years with a mean age of 50 ± 7.4 yrs in a study from Southeastern United States⁹, from 34 to 86 years with a mean age of 58 years at the East Harlem Partnership for Cancer Awareness free screening program¹⁰, from 40 to 83 years with a mean age of 57.4 ± 10.1 in those attending a free prostate cancer screening program at an equal access tertiary care center in the USA¹⁸, and from 37 to 91 years with a mean age of 66.5 years in those offered prostate cancer screening in the Knoxville, Tennessee metropolitan area¹⁹. Age in our study cohort ranged from 37 to 91 years (mean 57.1 ± 8.9 yrs) indicating, in accordance to similar studies, that free PSA testing attracts younger people than those participating in large, mass screening studies. Another finding from our study and from those offering free PSA testing^{9,10,18,19} is the proportion of men undergoing testing without being appropriate candidates for screening according to contemporary guidelines. The reasons for this might denote inappropriate knowledge or guidance about PSA testing and/or exaggerated anxiety and/or fear of prostate cancer; nevertheless, the phenomenon must be further exploited. The distribution of PSA values among men without known prostate cancer in the general male population seems to be no different among countries or even continents. Despite of not being a mass screening study, our cohort showed comparable characteristics to men from large cross - sectional surveys and screening trials (Table 1)¹⁵.

²⁰. PSA values increase with age; the factors involved include increasing prostate volume, prostate infections, prostatic infarction, microscopic prostate cancer, and prostatic aging. Age - specific PSA reference ranges are a result of the increasing mean PSA and increasing PSA variance in successively older cohorts of men¹⁶.

“Normal” and “abnormal” PSA levels have haunted the scientific community from the 1980s. After several trials, a level of more than 4 ng/mL became the standard for prompting further diagnostic evaluation²¹. However, data from a large, multicenter trial showed that over 15% of men with PSA ≤ 4 ng/mL who undergo prostate biopsy may be found to have prostate cancer²². This has reignited the discussion over “normal” PSA levels and whether the threshold for prostate biopsy should be lowered despite of the concomitant lowering in specificity. In the ERSPC trial PSA cut - offs varied from 2.5 to 4.0 ng/mL while in the PLCO study it was set at 4.0 ng/mL¹⁵. The percentage of men with PSA levels ≥4.0 ng/mL in our study group was 5.4%; however it increased to 7.4% if men aged less than 55 and over 70 were excluded. The increased percentage of young men (< 40 years) with PSA levels ≥2.5 ng/mL (12.2%) can be attributed to contamination with possible prostatitis cases. In the ERSPC trial the corresponding percentage of men with PSA levels ≥4.0 ng/mL ranged from 8% in Finland and Spain to 13% in Belgium (1%, 12% and 8% for Italy, Portugal and Spain, respectively)¹⁵, while in the PLCO trial it was 7.9%²³.

Despite the relatively high rates of opportunistic PSA testing worldwide, routine screening remains controversial given the results of a recent meta - analysis of its effect on mortality⁴. Nevertheless, prior to undertaking PSA testing, a number of risks and benefits should be disclosed to patients²⁴; consequently, shared decision - making is recommended by all major urological societies⁶. Prior research has, however, shown poor knowledge of the risks and benefits of PSA testing among men reporting having received a PSA test in the past^{13,25}.

Although offering free prostate screening is a successful method of reaching men who might otherwise not be tested¹⁰, they may also attract men who are not candidates for screening or have an incomplete or inaccurate knowledge of prostate cancer. Parameters of men’s knowledge, attitudes, and health beliefs and behaviors should be further exploited as they could assist in the design of educational interventions. 

Περίληψη

Σκοπός: Ο προσδιορισμός του PSA στο αίμα χρησιμοποιείται στον προσυμπτωματικό έλεγχο του προστατικού καρκίνου τόσο μαζικά όσο και ευκαιρικά. Δυστυχώς δεν έχει μέχρι τώρα γίνει μία διερεύνηση των υπέρ και των κατά όσον αφορά το τεστ και τη συμπεριφορά των ασθενών σε σχέση με τον προσυμπτωματικό έλεγχο. Σκοπός της μελέτης είναι η διερεύνηση των δημογραφικών χαρακτηριστικών και της διανομής του PSA σε έναν αυτοεπιλεγμένο πληθυσμό κατά την εβδομάδα επίγνωσης του προστατικού καρκίνου, που έλαβε χώρα το 2014.

Μέθοδος: Η μελέτη συμπεριέλαβε 4.453 άνδρες, οι οποίοι υποβλήθηκαν οικειοθελώς σε δωρεάν προσδιορισμό του PSA αίματος. Όλοι παρείχαν δημογραφικά στοιχεία, καθώς και στοιχεία σε σχέση με τα LUTS, προηγούμενες τιμές PSA, καθώς και προηγούμενες ουρολογικές εξετάσεις.

Αποτελέσματα: Η ηλικία των ανδρών κυμάνθηκε από 37 έως 91 έτη (μέση $57,1 \pm 8,9$ έτη). Η πλειψηφία ήταν μεταξύ 50 και 70 ετών, ενώ 24,7% ήταν < 50 ετών και 7,6% > 70 ετών. Το PSA κυμάνθηκε από 0,01 έως 109,4 ng/ml (μέση τιμή $1,38 \pm 2,31$ ng/ml). Ανάλογα με το όριο ($\geq 2,5 \geq 3,0$ ή $\geq 4,0$ ng/ml), ένδειξη για βιοψία προέκυψε σε 13,5%, 9,8% και 5,4% των ανδρών. Το PSA μετρήθηκε για πρώτη φορά στο 27,9% του πληθυσμού της μελέτης.

Συμπέρασμα: Ο ελληνικός ανδρικός πληθυσμός δείχνει μια θετική στάση στον προσυμπτωματικό έλεγχο του προστατικού καρκίνου με τον προσδιορισμό του PSA. Επιβάλλεται η περαιτέρω διερεύνηση των πρακτικών, συνηθειών και συμπεριφορών των ανδρών όσον αφορά τον προσυμπτωματικό έλεγχο.

**Λέξεις
ευρετηριασμού**
ειδικό προστατικό
αντιγόνο,
προσυμπτωματικός
έλεγχος, αυτο-
επιλεγμένος πληθυσμός

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