

RESEARCH COMMUNICATION

Prevalence of Prostate Cancer Among Men Aged 40+ Living in Osman Gazi Health Care District

Esin Çeber¹, Adnan Şimşir², Dilek Çakır Umar³, Ali Osman Karababa⁴, Gürhan Günaydın², Çağ Çal², Gülsün Özentürk^{1*}

Abstract

Background: Prostate cancer is a risk for men aged 40+ even if it is rarely seen among men under the age of 50. It is asymptomatic disease in its early period and if the person does not have an enlarged prostate it will be overlooked without screening. Consequently, the only way to diagnose prostate cancer in its early period is to determine the serum PSA (prostate-specific antigen) level of men aged 40+ and to do a digital rectal examination (DRE). **Objective:** The aim of this study is to determine the prevalence of prostate cancer among men aged 40+, to mention the significance of DRE and PSA by means of a training to be done with the aid of a booklet about early diagnosis, and to encourage men to consult a doctor and get the right treatment at the right time. **Methods:** The research was a descriptive field study, carried out among 660 men aged 40+ out of 3,285 men who live in Osman Gazi Health Care District, connected with the Presidency of Training and Research Health Group of Bornova. This group was selected as the smallest sample size by the systematic sampling method within the frame of setting the prevalence of prostate cancer at 10%, the confidence interval as 95%, the standard error as 2%. A total of 264 men of the sample group (participation rate 40%) agreed to a survey of International Prostate Symptom Score (I-PSS) projected by the study, and underwent DRE and PSA with a blood sample. **Results:** Increase in the serum PSA level (4ng/mL<) was determined in 10 men. Nodules were detected in 3 men together with the increase in PSA. One further nodule was detected only in DRE one examination of 12 participants. In the light of these data, it was decided to conduct a biopsy on 25 people, who had an increase in PSE and/or whose abnormalities were detected during DRE, in company with TRUS, and prostate cancer was detected in the biopsies of 5 people (1.89%). **Conclusions:** It can be thought that before a decision is made on routinizing prostate cancer screening, it may be more suitable to make randomized controlled screening trials for prostate cancer.

Keywords: Cancer - prostate cancer - PSA - DRE

Asian Pacific J Cancer Prev, **11**, 473-478

Introduction

In the world, lung cancer, colorectal cancer and gastric cancer take the first three places among the most frequently seen five cancer types in men and women. While the most frequently diagnosed cancers in men are lung and gastric cancer, breast and cervical cancer are the most commonly diagnosed cancers among women (National Cancer Control Programmes, 2007). In Turkey, lung, breast, gastric, skin and bladder cancers are the most commonly diagnosed five cancer types. The most commonly diagnosed five cancer types among women are breast, skin, gastric, ovarian and colon cancers; as for men, the cancers which affect them are lung, gastric, bladder, prostate and skin cancers (Turkey cancer control program and cancer statistics, 2002). According to the cancer incidence results resting upon the population-based registration system in Izmir (not including skin cancers except for melanoma), prostate cancer takes the fifth place

after lung, larynx, bladder and gastric cancers in men (The Data of Izmir Cancer Registry, 2007).

Due to the fact that the cause of prostate cancer is unknown, nutrition, hormones and other factors like some demographic factors including ethnogenesis, age, family history, marital status and occupation may trigger the occurrence of prostate cancer (Small, 1993; Gann, 2002; Key, 2002; Albersten, 2003; Crawford, 2003; Mazhar and Waxman, 2004, Mackay et al., 2006).

It is stated that prostate cancer is most frequently encountered among Afro-Americans in the world (275.3 out of 100.000 people) and this is 60% more than among white people. And this cancer is more frequently detected among white people (172.9 out of 100.000) than the ones living in Latin American countries (127.6 out of 100.000) and the countries of the Asian Pacific region (107.2 out of 100.000). It is declared that the prostate cancer mortality rate of the Afro-Americans between the years of 1992-1999 was 2.3 times more than of the white people, 3.3

¹Midwifery Department, ³Nursing Department, ²Izmir Atatürk School of Health, ⁴Urology Department, ⁴Public Health Department, Faculty of Medicine, Ege University, Izmir Turkey *For Correspondence: gulsun.ozenturk@ege.edu.tr

times more than of the ones living in the Latin American countries and 5 times more than of the Asia Pacific natives. Although there have been positive improvements in the 5-year-survival rates of the Afro-Americans in the last three decades, it has been stated that the survival rates are lower than the ones of the white people (in the cases detected between the years of 1992–1998, first 93%, then 98%) (Crawford, 2003).

It is known that prostate cancer is rarely seen among men under the age of 50 and the frequency of and deaths from this disease increase after the age of 50. It is stated that the rate of men diagnosed with prostate cancer under the age of 65 is below 70%. It is also stated that the chance of having prostate cancer shows increase starting from 0.005% under the age of 39, 22% (1 person out of 45) in the age group 40-59, and 13.7% (1 person out of 7) in the age group 60-79. The risk of developing prostate cancer during one's life is 16.7% (1 person out of 6), and autopsy studies demonstrate that the risk of prostate cancer development is high. It is known that there are studies which state that the risk of histological malignancy in the prostate is 20% between the ages of 50-60 and 50% between the ages of 70-80, and the risk of having prostate cancer of a 50-year-old man during his life is 42%, the risk of developing the disease is 9.5%, the risk of dying from prostate cancer is 2.9% (Crawford, 2003).

It is indicated that prostate cancer emerges earlier (about 6 or 7 years earlier) in the men with a family history of prostate cancer than the ones without it. Moreover, this disease emerges in the 5% and 10% of the cases with prostate cancer, the heredity factor of which is positive, and 40% of all the cases under the age of 55. The family history-based prostate cancer may have genetic factors. Yet, that being exposed to environmental harms or the frequency of the prostate cancer may cause the disease should not be ignored (Small, 1993; Albersten, 2003; Crawford, 2003).

Prostate cancer is more frequently seen among widowers and divorced men. It is stated that the risk increases together with the number of children, and prostate cancer is detected more in farmers, in textile, rubber and paint workers, and among the workers working in a place where cadmium, loggers, chemicals are found (Gann, 2002; Albersten, 2003; Crawford, 2003).

The fact that the rate of having prostate cancer is low in Japan is stated to stem from the high consumption of soy bean which is rich in isoflavones (genistein and daidzein). There are studies which highlight that isoflavones prevent cancer formation and metastases. It is stated in nutritional studies that the daily consumption of fat and red meat is high in the western way of living, and the increase in the total fat intake among African- and Asian-Americans is thought to be connected with prostate cancer (Key, 2002; Schroder, 2003; Mazhar and Waxman, 2004). It has been indicated in the population- and hospital-based case control studies realized in recent years that the risk of prostate cancer is found to be lower among men with diabetes, obesity and hyperinsulinemia have a connection with diabetes and both of them can decrease IGF-1 level and can change the level of endogenous steroid (Crawford, 2003). The results concerning that tomato and

its products reduce the risk of prostate cancer have been gathered through epidemiologic case-control studies. It is thought that carotenoids and phytochemicals are likely to be effective factors, but lycopene which is found more in tomatoes is underscored (Crawford, 2003; Schroder et al., 2003). There are various studies which put forward the effect of selenium found in red meat, fish and grains on the protection against prostate cancer (Crawford, 2003). This strong relation results from the protective mechanism of antioxidants.

The changing oestrogen and androgen metabolite levels may cause prostatic hyperplasia or prostate cancer (Gann, 2002). Even, it is recommended to do forward-looking studies which are thought to play an important role concerning prostate cancer etiology and which can prove that prostate cancer and liver cirrhosis show increase together. Due to these reasons, it is stated that studies to be done in high-risk populations in order to determine the environmental and genetic factors are going to contribute to understand the disease better and to accelerate prophylaxis studies (Crawford, 2003; WHO, 2007).

In general, the first assessment to diagnose prostate cancer is to be done through DRE. Yet, cancer is detected via biopsy only in half of the cases suspected of malignancy in DRE. Cancer is diagnosed in approximately 17% of the cases which have been evaluated as benign during the medical examination, but applied biopsy because of high PSA. The most important part of DRE in the diagnosis of prostate cancer is to determine the cases in which an increase has not been detected in the PSA level (2.5–4.0ng/ml), but malignancy has been suspected during physical examination. However, the fact that most of the time men refuse to undergo a DRE in order to diagnose prostate cancer makes it difficult to reach the target population in the screening practices (Carvalho et al., 1999; Nijs et al., 2000).

Prostate cancer is an asymptomatic disease in its early period. If the person does not have an enlarged prostate along with cancer and complaints related to it, there may be no cancer-specific symptoms. Consequently, the only way to diagnose prostate cancer in its early period is to annually determine the serum PSA (Prostate-specific Antigen) level of men aged 40+ and to do a Digital Rectal Examination (DRE) (National cancer control programmes, 2007; WHO, 2007). Some studies highlight that the chance to detect prostate cancer is 40-50% through PSA or DRE, and this rate will increase if both of them are done together (Gambert, 2001; Peron et al., 2002; Barros et al., 2003; D'Ambrosio et al., 2004). It was stated in a study done to determine the prevalence of prostate cancer among men whose PSA levels were 4.0ng/ml that the men whose PSA levels were normal (4.0ng/ml or below) were diagnosed with prostate cancer via biopsy, and the cases detected in the early period would be treated successfully through surgery (Holmberg et al., 2002).

It has been asserted in the recent prostate screening studies that the use of PSA has become widespread and determining prostate cancer via PSA has been much more effective than the sole use of DRE (Crawford, 2003; Ito, 2004, WHO, 2007). In general, while PSA and DRE are

done together in the prostate cancer screening practices, TRUS is done in the cases required (Peron et al., 2002; Schroder, 2003; Ito, 2004; WHO, 2007). TRUS is a method which is used very often to monitor prostate gland. Besides its being respectively easy to apply, TRUS makes it possible to monitor the internal structure of the prostate gland in detail. Hence, non-palpable lesions can be monitored through TRUS. The best method to diagnose cancer by providing the histological assessment of prostate gland is a TRUS guided biopsy. It is a fast and effective method which has acceptable morbidity along with antibiotic prophylaxis. Although its superiority to DRE in detecting cancer cases has been shown in several studies, its high cost, low sensitivity, and specificity limit its use in the early detection of prostate cancer. The TRUS image of prostate cancer is frequently localized hypoechoic areas in the peripheral zone. Yet, it should be kept in mind that cancerous parts may also be seen as isoechoic and hyperechoic (Hammerer & Huland, 1994).

Materials and Methods

Sampling

This research was realized in Osman Gazi Health Care District, connected with the Presidency of Training and Research Health Group of Bornova, between the years of 2003-2005. It is a descriptive field study. 660 men aged 40+ out of 3285, living in this neighborhood, were determined as the smallest sample size in the frame of 10% prevalence of prostate cancer, 95% confidence interval, 2% standard error (by the use of systematic sampling method). However, because of the difficulties met in the research, 264 men of the sample group were reached (participation rate 40%).

These 660 men who took a questionnaire and were informed about the research were invited to Osman Gazi Health Care Center for appointment in order to be examined (DRE) by an urologist and to give blood samples (PSA). The ones who did not turn up for the first appointment were invited again. Yet, 354 men refused to undergo DRE and 7 men stayed out of the research because of health problems or death (total 361 men). The other 299 men were made to sign an informed consent form to undergo a medical examination and to give a blood sample. Since 35 men did not turn up for the appointment 264 men were included in the research.

Three different data gathering forms were used in the research: the questionnaire regarding socio-demographic characteristics, reproductive health status and prostate cancer risk; the International Prostate Symptom Score (I-PSS) index; a medical examination form regarding prostate cancer and its early diagnosis. I-PSS index consists of 7 symptom questions concerning the complaints about hyperplasia of prostate that are evaluated through the use of 0-5 point likert scale. The symptoms are ranked from 0-to-35 points and 0-7 points show that the complaint is mild, 8-19 points show that it is moderate, and 20-35 points show that it is advanced.

Training Program

The interviewer students were trained about the use

of the questionnaire and about giving information in the booklet concerning prostate cancer. The questionnaire was administered to 660 men aged 40+ living in Osman Gazi Health Care District in their homes during face-to-face interviews. They were trained in the early detection of prostate cancer through the booklets named "Prostate Enlargement and Things You Want to Know about Prostate Cancer". After the training, the booklets were given to the interviewers. The 660 men, who were given a questionnaire and trained, were informed about DRE which would be done by an urologist and about determining their serum total PSA levels and they were invited to the Osman Gazi Health Care Center on the predetermined days.

Ethics

The required permissions were granted from the Research Ethics Committee of Ege University Izmir Atatürk School of Health in order to conduct the research and from the Presidency of Health Group of Bornova in order to gather data; the medical examinations related to prostate cancer were done free of charge by an urologist; the project resources were used to determine the PSA levels of the participants and they weren't charged for it, and also after the participants were told about the objectives of the study, their informed consents which were related to the participation in the research and medical examination were obtained.

Data Analysis

The analysis of the data obtained from the research was done through SPSS (Statistical Package For Social Science). The number and percentage distributions of the 264 men aged 40+ who underwent DRE and whose blood inspections were done for PSA were realized in the data analysis.

Results

As the descriptive characteristics of the men aged 40+ whose DRE and PSA inspections were done were analyzed, 21.6% of them were in 45-49 age group and the mean age was 55.18 ± 8.41 (min:41, max:79). 51.1% were primary school graduates, 96.6% were married, 59.8% were retired and 62.1% had a social security. The mean number of kids of the participants were determined to be 3 ± 1.74 (min: 0, max:10).

66.7% of the 40+-year-old participants smoke. The mean number of cigarettes smoked every day was stated to be 21 ± 12.90 (min:0, max:80). The mean duration of smoking of the men was 27.46 ± 11.91 (min:0, max:51) years. 45.8% of the participants said that they consumed alcohol, and their mean duration of alcohol consumption was determined to be 23.42 ± 11.79 (min:1, max:60) years. 66.7% of the men said that they smoked cigarettes and 45.8% said that they smoked cigars.

When the information related to the reproductive health status of the men aged 40+ and living in Osman Gazi Health Care District was analyzed, it was found out that 92% of them did not get a sexually transmitted disease, 35.6% stated that they did not use a family planning

Table 1. Some Lifestyle and Nutritional Habit Characteristics of Men

Lifestyle Characteristics	No	%
Smoking		
Yes	176	66.7
No	88	33.3
Alcohol Consumption		
Yes	121	45.8
No	143	54.2
Total	264	100

Table 2. Men's State of Having Prostate Cancer and Other Types of Cancer Cases in the Family

The State of Having Prostate Cancer Case in the Family	No	%
No	239	90.5
Yes	25	9.5
Closeness		
Father	17	6.4
Sibling	3	1.1
Paternal uncle-Maternal uncle	4	1.5
Father+grandfather	1	0.4
The State of Having a Cancer Case in the Family		
No	207	78.4
Yes	57	21.6
Total	264	100

method. The mean frequency of having a sexual intercourse of the participants was 6 ± 4.55 (min: 0, max: 28) per month.

The Results related to Prostate Cancer Risks

In Table 2, the status of having a prostate cancer and other types of cancer in the families of the men aged 40+ living in Osman Gazi Health Care District are shown. 90.5% of the men stated that nobody had prostate cancer in their families, 9.5% said that they had a family history of prostate cancer and 6.4% stated that their fathers had prostate cancer. No cancer case has determined in the families of 78.4% of the men.

As the men were assessed according to the International Prostate Symptom Score (I-PSS), 75% "mild", 17.8% "moderate" and 6.8% "advanced" occlusions were determined in the prostates of men.

The Results Related to the Prevalence of Prostate Cancer

264 men who took part in the study were done DRE for their physical examinations, and their blood samples were taken in order to determine the serum PSA level. The increase in the total serum PSA level alone ($4\text{ng/mL} <$) was determined in 10 men. A nodule was detected in 3 people along with the increase in the serum PSA level. A nodule was detected in the examination of 12 participants only during DRE. By these data, it was decided to conduct a biopsy on 25 people, who had an increase in PSE and/or whose abnormalities were detected during DRE, in company with TRUS (Table 3).

Prostate cancer was detected in the biopsies of 5 participants (1.89%). The characteristics related to the tumors detected in these people are shown in Table 4.

Table 3. The DRE and PSA Results of Men

DRE Level	No	%
Obscure	93	35.22
I	137	51.90
II	32	12.12
III	2	0.76
IV	-	
PSA Results		
0-3,9	251	95.07
4 and over	13	4.93

Table 4. The Characteristics related to the Tumor Detected in the Men with Prostate Cancer

Case	Total PSA T PSA	Free/ TRUS	Biopsy
1	14.35ng/mL	0.10	55gr, heterogeneous internal structure Gleason 4+3/10
2	16.50ng/mL	0.06	45gr, hypoechoic areas Gleason 3+4/10
3	5.15ng/mL	0.13	30gr, hypoechoic areas Gleason 3+3/10
4	18.70ng/mL	0.07	70gr, heterogeneous internal structure Gleason 3+3/10
5	8.20ng/mL	0.22	30gr, isoechoic Gleason 4+4/10

Discussion

Prostate cancer is one of the most frequently seen cancer types among men. Prostate cancer among men was determined to be 5.4/100.0000 in Izmir according to the age-standardized cancer incidence results which were based on the first population-based cancer registration data (1993-1994) in our country. In Turkey, there is not another comprehensive field study which has been done to determine prostate cancer incidence or prevalence. The prostate cancer prevalence study was realized by reaching 264 men aged 40+ and living in Osman Gazi Health Care District, connected with the Presidency of Training and Research Health Group of Bornova. This study is important in terms of its being the first study to determine prostate cancer prevalence and its being done by taking samples from the men aged 40+ who live in a specific district in Bornova.

Attempts to make an early diagnosis of cancer show differences from country to country. Prostate cancer programs scarcely exist in developing countries where the prevalence is low and health system is inadequate. Moreover, the participation of men in existing scanning programs is not at the desired level (Çeber et al., 2008). In the realization of doing some early diagnosis tests periodically, there exist troubles. WHO (World Health Organization) states that effective prostate cancer screening programs cannot be applied because the prevalence of hidden prostate carcinoma progressed with age is high and morbidity and mortality rates aimed at radical attempts which are used to cure prostate cancer are undervalued. However, training, early diagnosis and

screening services are of utmost importance in detecting cancer at an early stage (National Cancer Control Programmes, 2007). It is possible to make prostate cancer screening programs effective by doing well-organized randomized studies before making necessary suggestions for early diagnosis (The International Prostate Screening Trial Evaluation Group Report, 1999).

DRE and PSA are the methods which are often suggested for prostate cancer screening program (Carter et al., 1999; Albersten, 2003; Thompson et al., 2004). Also in this study, International Prostate Symptom Score (I-PSS) questionnaire, DRE and PSA inspections were used to determine the prevalence of prostate cancer. The fact that only 264 men participated in the study even if the sample size included 660 men in the beginning (reaching 40% of the sampling) was one of the limitations of the study. This limitation stemmed from men's reluctance to have a DRE. It is also underlined with the other studies that men's reluctance to get a DRE result in their low participation in the prostate cancer early diagnosis and / or screening programs (Nijs et al., 2000). In the study, the mean age of the men aged 40+ whose DRE and PSA inspections were done was determined to be 55.18 ± 8.41 , and 51.1% were primary school graduates, 96.6% were married, 59.8% were retired and 62.1% had a social security.

The fact that being at two-sided risk of prostate cancer because of father and brother's cancer history and more than one first-degree relatives' having prostate cancer increases the risk of catching prostate cancer. In this study, it was determined that nobody had prostate cancer in the families of 90.5% of the men aged 40+, prostate cancer case was seen in the families of 9.5% and the men with cancer were their fathers in the 6.4% out of this 9.5%. Epidemiological studies show that prostate cancer emerges earlier (nearly 6 or 7 years earlier) in the people with a family history of prostate cancer than the ones without a family history of prostate cancer. Besides, it is stated that the disease emerges in 5% and 10% of all the cases with prostate cancer where the heredity factor is positive, and it emerges in 40% of all the cases under the age of 55. Genetic effect may be a reason for family-based prostate cancer, but it should not be ignored that being exposed to known environmental harms or only the frequency of the disease can cause prostate cancer (Small, 1993; Albersten, 2003; Crawford, 2003).

According to the I-PSS score, 75% of the men participated in the study had "mild", 17.8% had "moderate" and 6.8% had "advanced" occlusions in their prostates. IPSS is a questionnaire which questions the seven symptoms including incomplete emptying, frequency, intermittency, urgency, weak stream, straining and nocturia. The symptom scores were used more to standardize the frequency of the symptoms of men aged 40+ in the beginning than they were used for the diagnosis of prostatic hyperplasia.

In prostate cancer, serum PSA level dramatically provides all the standard features of a tumor identifier. Still, because PSA is an organ-specific identifier not a tumor-specific one, it can show increase in the benign prostate cases (such as Benign Prostatic Hyperplasia, prostatitis). An increase in serum total PSA level can

also be determined by age. Normal total PSA level is accepted to be $<4.0\text{ng/ml}$ in common clinical applications (Catalona, 2000). In the blood samples taken from 264 men aged 40+ who participated in the study, an increase was determined in the total serum PSA level alone in 10 men (4ng/mL), and 3 nodules were determined in 3 men along with the increase in the serum PSA level.

The way to detect prostate cancer at an early stage is to determine serum PSA level in men aged 40+ and to do a DRE (Carter et al., 1999; National Cancer Control Programmes, 2007; WHO, 2007). It is stated that the chance of PSA test or DRE of picking up prostate cancer is 40-50% and this rate will increase through the application of both of them (Gambert, 2001; Peron et al., 2002; Barros et al., 2003; D'Ambrosio et al., 2004). As PSA and DRE are done together in the prostate cancer screening practices, transrectal ultrasonography (TRUS) is done in the cases required (Peron et al., 2002; Schroder et al., 2003; Ito, 2004; WHO, 2007). TRUS is a method which is used very often to monitor prostate gland. Besides its being relatively easy to apply, TRUS makes it possible to monitor the internal structure of the prostate gland in detail. Therefore, non-palpable lesions can be monitored through TRUS. In this study, nodule was detected in the examination of 12 men out of all the participants only through DRE. By these data, 25 men who had an increase in PSE and/or whose abnormalities were detected during DRE were conducted a biopsy in company with TRUS. At the end of the study, prostate cancer was detected in the biopsies of 5 men (1.89%).

This study was conducted in order to determine the prevalence of prostate cancer among 40+-year-old men living in Osman Gazi Health Care District, connected with the Presidency of Training and Research Health Group of Bornova. Although 660 men were determined to be the sample size through the use of Systematic Sampling Method, only 264 men from the sample group could be reached (participation rate 40%) due to the troubles met in the study (men's reluctance to have a DRE).

Acknowledgements

This project was supported by Ege University Scientific Researches Fund and Astra Zeneca. We would like to thank them for backing up this population-based research. Moreover, we would like to give our special thanks to the students of the Nursing Department of Izmir Atatürk School of Health of Ege University, to the Department of Medical Documentation and Secretaryship of Atatürk Medical Technology Vocational Training School and to volunteer students in EBILTET (Ege University Science and Technology Society) for their devotion to the study.

References

- Albersten CP(2003). The prostate cancer conundrum. *J Natl Cancer Inst*, **95**, 931.
- Barros MS, Silva VRS, Santos GB, et al (2003). Prevalance of prostate adenocarcinoma according to race in an university hospital. *Int Braz J Urol*, **29**, 306-12.

- Carter HB, Landis PK, EJ Metter, et al (1999). Prostate-specific antigen testing of older men. *J Natl Cancer Inst*, **91**; **20**, 1737.
- Carvalho GF, Smith DS, Mager DE, et al (1999). Digital rectal examination for detecting prostate cancer at prostate specific antigen levels of 4 ng/ml or less. *J Urol*, **161**, 835.
- Catalona WJ, Ramos CG, Carvalho GF, et al (2000). Lowering PSA cutoffs to enhance detection of curable prostate cancer. *Urology*, **55**, 791.
- Ceber E, Çakır D, Oğce F, et al (2008). Why do men refuse prostate cancer screening? Demographic analysis in Turkey. *Asian Pac J Cancer Prev*, **9**, 387-90.
- Crawford DE (2000). Epidemiology of prostate cancer. *Urology*, **362**, 3-12.
- D'Ambrosio G, Samani F, Cancian M (2004). Practice of opportunistic prostate-specific antigen screening in Italy: data from the health search database. *European J Cancer Prev*, **13**, 383-6.
- Gambert SR (2001). Prostate cancer: When to offer screening in the primary care setting. *Geriatrics*, **56**, 29-31.
- Gann PH (2002). Androgenic Hormones and Prostate Cancer Risk: Status and Prospects. Nutrition and Lifestyle: Opportunities for Cancer Prevention (Edts. Riboli E and Lambert R). WHO/IARC, Lyon/France, No. **156**, 283-9.
- Hammerer P, Huland H (1994). Systematic sextant biopsies in 651 patients referred for prostate evaluation. *J Urol*, **151**, 99.
- Holmberg L, Bill-Axelsson A, Helgesen F, et al (2002). Scandinavian Prostatic Cancer Group Study Number 4. A randomized trial comparing radical prostatectomy with watchful waiting in early prostate cancer. *N Engl J Med*, **347**, 781-9.
- Ito K (2004). Advancements in PSA-based Screening for Prostate Cancer. *Rinsho Buyori*, **52**, 611-7.
- İzmir Kanser İzlem ve Denetim Merkezi Verileri (2007). www.ism.gov.tr/kidem. Ulaşım tarihi: Ocak 2007
- Key TJ (2002). Prostate Cancer: Rates in Europe, Dietary Hypotheses, and Plans for EPIC. Nutrition and Lifestyle: Opportunities for Cancer Prevention (Edts. Riboli E and Lambert R). WHO/IARC, Lyon/France, No. **156**, 197-201.
- Mackay J, Jemal A, Lee NC, et al (2006). The Cancer Atlas. Atlanta USA
- Mazhar D, Waxman J (2004). Diet and prostate cancer. *BJU International*, **93**, 919-22.
- National cancer control programmes, WHO, www.who.int/cancer/nccp/en Ulaşım tarihi: Şubat 2007
- Nijs HGT, Essink-Bot ML, Dekoning HJ, et al (2000). Why do men refuse or attend population-based screening for prostate cancer?. *J Public Health Medicine*, **22**, 312-6.
- Peron L, Moore L, Bairetti I, et al (2002). PSA screening and prostate cancer mortality. *CMAJ*, **166**, 587-91.
- Schroder HF, Maas P, Beemsterboer P, et al (2003). Evaluation of the digital rectal examination as a screening test for prostate cancer. *J Natl Cancer Inst*, **90**, 1817-23.
- Screening for Prostate Cancer, WHO, www.who.int/cancer/detection/prostatecancer/en/index.html, Ulaşım tarihi: Şubat 2007
- Small EJ (1993). Prostate cancer: Who to screen, and what the results mean. *Geriatrics*, **48**, 28-30.
- TC Sağlık Bakanlığı, Türkiye'de Kanser Kontrol Programı ve Kanser İstatistikleri (2002). 1995-1999, Yayın No:618, Ankara, s: 145.
- Thompson IM, Pauler DK, Goodman JP, et al (2004). Prevalence of prostate cancer among men with a prostate-specific antigen Level 4.0 ng per milliliter. *N Eng J Med*, **351**, 1470.
- Uluslararası Prostat Tarama Çalışmalarını Değerlendirme Grubu Raporu, 1999