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Original article

Risk factors for prostate cancer: A case control study

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Abstract

Background: Prostate cancer is the second leading cause of cancer-related death in men. The aim of this study was to examine the association between the prostate cancer and the possible etiological agents.

Methods: In a case-control study, 60 men with prostate cancer who were between 40 to 65 years of age were studied over the period between March 2013 and May 2016. For each prostate cancer case, there was a control, who was matched in terms of age and residence. The demographic factors of the men with prostate cancer were compared with those of the healthy cases as a control group.

Results: After adjusting the variables, the obesity (BMI ≥ 25) (OR= 16.07, 95% CI= 4.90-52.67), the sitting height ≥ 111 (OR= 6.45, 95% CI= 1.87-22.23), the current use hookah (OR= 1.84, 95% CI= 0.48-7.03), and the positive family history of the prostate cancer (OR= 55.60, 95% CI= 9.04-341.93) were found to be all associated with an increased risk of prostate cancer.

Conclusion: To decrease the prostate cancer among Iranian men, more emphasis should be placed on screening programs to identify prostate cancer in men with the positive family history of cancer, the overweight ones, the ones with higher sitting height, and those who use hookah.

Keywords: Prostate cancer, Smoking, Hookah, BMI

Introduction

Prostate cancer, which is approximately 33%, is the second most common cancer after stomach cancer among Iranian men (1-3). Prostate – specific antigen (PSA) is regarded as a risk determinant of prostate cancer. Therefore, the National Medical Association and the American Urologic Association highly recommend its screening annually in men. It is worth noting that few Iranians go through PSA screening annually (4). Currently, there are four cities in Iran in which PSA tests are being piloted by The Iranian Health Ministry.

The association for prostate cancer is teeming with such varied demographic and personal information as (5) age, race, the positive family history of prostate (6), income, education, lifestyle (7), which are all still controversial in terms of incidence. Many studies have focused on the risk factors associated with prostate cancers in developed countries (8). However, there is a dearth of information about these issues concerning Iranian men.

Prostate cancer is a preventable cancer. It is worth mentioning that nerveless prostate cancer still has the second greatest incidence with metastasis from adjacent to prostate at detection (9). In this study, we sought to identify the association between prostate cancer and the possible etiological agents, which can play an important role in screening the presence of this cancer in men.

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Table 1. Characteristics of cases and controls

		Case (n=60) N (%)	Control (n=60) N (%)	P-value
Age (years)	<50	7(11.7)	15(25.0)	0.165
	50-60	26(43.3)	33(38.3)	
	>60	37(45.0)	22(26.7)	
Marital status	Never married	3(5.0)	4(6.7)	0.697
	Married/ separated	57(95.0)	56(92.3)	
Educational level	<Middle school	38(63.3)	35(58.3)	0.758
	High school	5(8.3)	7(11.7)	
	>College	17(28.3)	18(30)	
Residence status,	Urban	34(56.7)	38(63.3)	0.456
	Rural	26(43.3)	22(26.7)	
Occupation	Non manual	32(53.3)	35(58.3)	0.581
	Manual	28(46.7)	25(41.7)	
Income tertile	High	16(26.7)	33(55.0)	0.002
	low/ middle	44(73.3)	27(45.0)	
BMI * (kg/m^2)	<25	12(20.0)	43(71.7)	0.0001
	≥25	48(80.0)	17(28.3)	
Height (cm)	<172	26(43.3)	27(45.0)	0.854
	≥172	34(56.7)	33(55.0)	
Sitting height (cm)	<111	17(28.3)	35(58.3)	0.001
	≥111	43(71.7)	25(41.7)	
Chronic disease**	Yes	11(18.2)	15 (25)	0.375
	No	49(81.7)	45 (75)	
Cigarette smoking	no	27(45.0)	42(70.0)	0.067
	Positive history***	12(20.0)	7(11.7)	
	Current	21(35.0)	11(18.3)	
Use hookah	no	39(65.0)	47(78.3)	0.005
	Positive history	4(6.7)	9(1.5)	
	current	17(28.3)	4(6.7)	
Alcohol consumption	no	37(61.7)	50(83.3)	0.008
	Yes	23(38.3)	10(16.7)	
History of alcohol consumption (years)	never	37(61.7)	5(83.3)	0.172
	< 5	10(16.7)	5(8.3)	
	≥ 5	13(21.7)	5(8.3)	
Family history of prostste cancer	No	19(31.7)	56(93.3)	0.0001
	Yes	41(68.3)	4(6.7)	

* BMI: body mass index; **Dyslipidemia, hypertension, cerebral vascular accident, cardiovascular disease, diabetes, thyroid disease, liver disease; *** Positive history: smoking at least 100 cigarettes during their lifestyle

Materials and Methods

This study was approved by the ethic committee of Babol University of Medical Sciences. We evaluated all men, who were between 40 to 65 years of age, based on the diagnosis of prostate cancer confirmed by the prostate biopsy center of Shahid Beheshti hospital in Babol over the period between March 2013 and April 2016. A total number of 68 medical records were evaluated out of which eight men were ill or declined. Finally, a total number of 60 cases were interviewed and agreed to complete the questionnaires. All the participants were given a written informed consent for the use of data for this study. The inclusion criteria were: individuals with the confirmed diagnosis of prostate cancer based on the pathology results, and those who were not suspected to have the prostate metastases of different tumors.

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Table 2. Adjusted odds ratio (OR) for prostate cancer* according to risk factors

		Odds ratio	95% Confidence interval	P-value
BMI ** (kg/m^2)	<25	1.00		
	≥25	16.07	4.90-52.67	0.0001
Income tertile	low/ middle	1.00		
	High	0.56	0.18-1.78	0.327
Sitting height (cm)	<111	1.00		
	≥111	6.45	1.87-22.23	0.003
Cigarette smoking	no	1.00		
	Positive history	1.51	0.27-8.46	0.642
	Current	1.84	0.48-7.3	0.372
Use hookah	no	1.00		
	Positive history	0.19	0.02-1.50	0.116
	current	4.38	1.00-19.1	0.05
History of alcohol consumption (years)	never	1.00		
	< 5	2.29	0.25-20.59	0.459
	≥ 5	1.08	0.19-5.98	0.39
Family history of prostste cancer	No	1.00		
	Yes	55.60	9.04-341.93	0.0001

*Potential confounders used in each characteristics were other characteristics
** BMI: body mass index

For each prostate center case, there was a control case, who was matched in age. The control cases were randomly selected out of the men, 40 - 65 years of age, who referred to Shahid Beheshti hospital and had no evidence of prostate cancer. All the participants in the control group were also given written informed consent forms. PSA screening and rectal examinations were performed on all men who agreed to be control cases. None of the cases in the control group had prostate cancer, infection of urinary tract, or history of prostate disease or surgery. The control group included men with a PSA below 2.0 ng/mL. Then, a structured questionnaire including socio-demographic factors, the family history of prostate cancer, health and lifestyle variables (alcohol intake and smoking) was administered to the participants. The height, the waist circumference, and the sitting height were also measured.

The cases were between 40-65 years of age when they were confirmed to have prostate cancer, and the age of men in the control group was their age at the interview time. The weight of men was their weight when they were confirmed to have prostate cancer, and the weight of men in the control group was their weight at interview time. Height was measured to the nearest 1 cm, without shoes, with a tape measure.

The lifestyle questionnaire sought information on alcohol intake and smoking. The smoking history had categories like: never (those who had never been smoking), past smokers (those who smoked at least 100 cigarettes during their life), and currently non smokers.

Menn with a history of dyslipidemia, hypertension, cerebral vascular accident, cardiovascular disease, diabetes, thyroid disease, or liver disease was diagnosed as chronic disease.

Statistical analysis

The descriptive analyses including the frequencies, ranges, and the percentages of variables were conducted for each variable in each group. The characteristics of men with and without prostate cancer were compared using $\chi 2$ statistics. To assess the associations between the prostate cancer and the risk factors, bivariate conditional logistic regression analyses at P=0.2 were used. The potentially important risk factors were tested with stepwise multivariate conditional logistic regression analysis. The odds ratios (ORs) were estimated by univariate and multivariate models through the maximum likelihood and the corresponding 95% confidence intervals (CIs). All statistical analyses were performed using Statistical

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Package for Social Sciences (SPSS) version 16.0, and the P <0.05 was considered statistically significant.

Results

The means for the age of the participants in the case and the control group were 58.5 ± 6.3 and 56.4 ± 2.6, respectively. The characteristics of the subjects in both groups are summarized in Table 1. There was a higher proportion of economy (P=0.002), the positive family history of prostate cancer (P=0.0001), the body mass index ≥25 Kg/m^2(p=0.0001), the sitting height ≥111 cm (0.001), current smoking (0.067), current hookah (0.005), and alcohol consumption (0.008), in the case group as compared with those of the control group. There was no significant difference between the percentages of subjects in the case group and those of the control group in terms of marriage status, age, education level, residence (urban/rural area), job, height, the history of alcohol consumption for < 5 years, and the history of chronic disease .

Table 2 demonstrates the odd ratios (ORs) of prostate cancer risk factors using univariate and multiple logistic regression models with the likelihood of 95% CI in men suffering from prostate cancer and those in the control group. After adjusting the variables, the obesity (body mass index ≥25) (OR 16.07, 95% CI 4.90-52.67), the sitting height ≥ 111 (OR 6.45, 95% CI 1.87-22.23), current hookah (OR 1.84, 95% CI 0.48-7.03), and the positive family history of prostate cancer (OR 55.60, 95% CI 9.04-341.93) were found to be associated with an increased risk of prostate cancer.

Discussion

The present study detected evidence for a strong association between body mass index ≥ 25 and prostate cancer. In our study, men with body mass index ≥25 showed a positive association. This result seems to be consistent with that of Bostwick et al. , which found a strong association between prostate cancer and body mass index (6). Another obvious finding emerging from the analyses is that 43 % of the men with the sitting height of ≥ 111 cm suffered from prostate cancer and 25% did not. This finding supports the result of the previous study by Zuccolo et al. that found an increased risk of prostate cancer, which was associated with the sitting height (10). Moreover, Zuccolo et al's study also detected that height and leg were associated with an increased risk of advanced prostate cancer. After adjusting the confounding variables, we found a lack of evidence for the association between prostate cancer and height. This difference could be attributed to the limited sample size.

In addition, the present study detected a potent association between a positive family history and prostate cancer. This result is in line with the Chan et al. who reported an association between the positive family history and prostate cancer (11).

Dai et al. demonstrated that the increased androgen hormones in smokers could diminish the risk more than the case of nonsmokers (12). In addition, a meta-analysis showed a significant association between smoking and prostate cancer (13) . However, one study (14), similar to ours did not find smoking as a risk factor for prostate cancer after adjusting the confounding variables.

The relationship between alcohol consumption and prostate cancer is still unknown. Although some studies have shown a significant association between alcohol drinking and prostate cancer (15, 16), others did not report a significant relationship between alcohol consumption and prostate cancer (17, 18). Accordingly, it is difficult to justify this result, but this could be attributed to the culture of people and the ban on the use of cigarettes and alcohol in Iran.

One of the limitations of our study was the use of case control design to determine the risk factors for prostate cancer. Future studies are expected to use longitudinal data, which can provide stronger evidence for the relationships. However, the appropriacy of case-control data can represent at least a valuable association. This study failed to analyze all the risk factors associated with prostate cancer such as diet, the screening program, and the knowledge of the participants. A large well-designed, multi-center cohort is needed to identify all the socio-demographic factors of prostate cancer in Iran.

In conclusion, this study identified the associations between prostate cancer and the risk factors including the obesity, the sitting height, smoking, alcohol consumption, and the positive family history of prostate cancer compared with those of the healthy participants. Finally, to decrease the prostate cancer among Iranian men, more emphasis should be put on screening programs to identify prostate cancer in men. There is also an urgent need for practical education to raise men's knowledge about the potential risk factors of prostate cancer.

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Conflict of interest

The authors declare that there is no conflict of interests.

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