Cigarette Smoking and Prostate Cancer Risk: Negative Results of the Seoul Male Cancer Cohort Study

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Abstract

We evaluated cigarette smoking as a risk factor for prostate cancer in a prospective, population-based cohort study. The subjects were 14,450 males among the participants in the Seoul Male Cancer Cohort Study who had at least 1-year follow-up. They were followed up between 1993 and 2008. During the 16-year follow-up period, 87 cases of prostate cancer occurred over the 207,326 person-years of the study. The age-adjusted relative risks of past and current smokers at entry were 0.60 (95% CI: 0.34-1.06) and 0.70 (95% CI: 0.43-1.13), respectively, suggesting that cigarette smoking may not be a risk factor for prostate cancer. The relationship between prostate cancer and other modifiable factors, such as Westernized diet, should be studied with the goal of establishing prevention programs for prostate cancer.

Keywords: Prostate neoplasms - cancer incidence - cigarette smoking - cohort study

Asian Pac J Cancer Prev, 14 (8), 4667-4669

Introduction

Prostate cancer is the most frequently diagnosed cancer among men in developed countries and has the second highest incidence worldwide (Jemal et al., 2011). Migrant studies demonstrating an increase in the incidence of prostate cancer among men who move from low-to-high-incidence countries (Cook et al., 1999) suggest that environmental factors may play a role in the development of prostate cancer.

Smoking is a modifiable environmental factor that may increase the risk of prostate cancer because cigarettes contain several known carcinogens and have been reported to increase circulating levels of androgens in men (Pour, 1919; Dai et al., 1988). Huncharek et al. (2010) argued an association between smoking and the incidence of prostate cancer in a meta-analysis of 24 prospective cohort studies. However, one of their results showed no increase in the risk of cancer in current smokers.

Previous observational studies of the link between smoking and prostate cancer in humans have yielded inconsistent results, and the incidence of prostate cancer varies widely according to race and ethnicity (Huncharek et al., 2010; Mordukhovich et al., 2011); thus, the present study used a population-based, prospective cohort design to evaluate the relationship between smoking habits and the risk of prostate cancer in Korean men.

Materials and Methods

Study cohort

The source population was the participants of the Seoul Male Cancer Cohort (SMCC) study, which has been reported elsewhere (Bae et al., 2002; 2007; 2013). The cohort was constructed in 1992 and 1993 for investigating the association between exposure to modifiable lifestyle factors and the risk of major cancers in Korean men. The age distribution of this cohort is similar to that of the Korean population. After excluding subjects with less than 1-year follow-up, 14,450 men were included in the present study.

A 15-page confidential questionnaire including questions on smoking habits was used to collect information about smoking status (never, past, current), duration of smoking (years), and daily amount of smoking (cigarettes/day). The reproducibility and validity of the questionnaire was evaluated in a subset of participants (Kim et al., 1996).

Follow-up was conducted over the 16-year period between January 1, 1993, and December 31, 2008. The incidence of all cases of cancer, including prostate cancer, occurring during the 16-year follow-up period were identified using the Seoul Regional Cancer Registry (SRCR) database, a population-based cancer registry in South Korea.

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Categorization of variables

Subjects were categorized at entry according to age (40-44, 45-49, 50-54, and 55-59 years), duration of smoking (0, 1-10, 11-20, 21-30, or 31+ years), daily amount of smoking (0, 1-10, 11-20, 21-30 or 31+ cigarettes/day), and total cigarette index (TCI) obtained from smoking duration times daily amount of smoking (0, 1-10, 11-15, 16-20, 21-34 or 35+ packs/year).

Statistical methods

Accumulated person-years were calculated by determining the number of days from the initiation of follow-up, January 1, 1993, until the date of cancer diagnosis, death from other causes, or the end of the follow-up period, December 31, 2008, after which the number of days was converted into years. The age-adjusted relative risk (aRR) was calculated using the Cox proportional hazards regression. Confidence intervals were obtained using the Wald method, and all reported p values are two-sided. The chi-squared test for trends was used to evaluate linear trends. Analyses were conducted using Stata software ver. 12 (StataCorp, 2013) (http://www stata.com/).

Results

Table 1 shows the distribution of participants by age and smoking status at entry into the study and the accumulated person-years of follow-up. During the total 207,326 person-years of follow-up, 87 newly diagnosed cases of prostate cancer were identified in the 14,450 study participants. Because the risk of prostate cancer was strongly age-dependent, the aRR were calculated using Cox’s proportional hazard model.

Table 2 shows the estimated aRRs and 95% CIs according to smoking history at entry. The risk of prostate cancer was slightly lower for past (aRR, 0.60) and current smokers (aRR, 0.70) compared to never-smokers, although the difference was not statistically significant.

We found no significant effect of duration of smoking, amount of daily smoking, or total cigarette index on the aRR of prostate cancer, with the exception of 21-30 years of smoking duration. However, no significant trend with regard to the smoking duration was observed (p for
This study was supported by the 2013 scientific promotion program funded by Jeju National University (2013-0144).

Acknowledgements

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