

Lung Cancer Incidence by Smoking Status in Korean Men: 16-Years of Observations in the Seoul Male Cancer Cohort Study

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Lung cancer has been the leading cause of cancer deaths for 25 years in the Korean population (1, 2). Doll et al. (3-5) reported that the relative risks (RRs) of mortality due to lung cancer and smoking in British doctors were 8.3, 14.9, and 14.6 during 20-, 40-, and 50-yr follow-up periods, respectively. These results suggest that the RR increased through the follow-up period. While lung cancer mortality is largely equivalent to the lung cancer incidence worldwide (6), it was previously reported that cigarette smoking increased the risk of lung cancer in Korean men by 4.18-fold during a 10-yr follow-up (7). We aimed to re-estimate the risk of lung cancer relative to cigarette smoking using a longer follow-up period to confirm that the RR increases with a longer follow-up period.

The subjects were recruited from the Seoul Male Cancer Cohort, and the methods, including the follow-up methods and statistical analyses, were identical to those previously published (7) with the exception of the follow-up period, which was extended to December 31, 2008.

The relative risk (RR) of smoking and mortality of lung cancer in British doctors was previously reported to have increased throughout a 40-yr period. Here, we evaluated this RR based on the incidence of lung cancer in Korean men using a longer follow-up period. We compared our data to the RR reported in a study using a 10-yr follow-up period; the subjects and methods were identical to those of the previous paper with the exception of the follow-up period, which ended on December 31, 2008. We found that the RR of smoking habits in patients with lung cancer did not increase, and that the data showed narrowing 95% confidence intervals over a longer observation in Korean men. Estimated lung cancers attributable to smoking were 55.6%. These results highlight the need for an intervention program to help patients quit smoking in Korea.

Key Words: Cancer Incidence; Cigarette Smoking; Cohort Study; Lung Neoplasm

During 203,870 person-years of follow-up, 123 newly diagnosed cases of lung cancer were identified among the participants. After adjusting for potential confounders, the adjusted RRs (aRRs) of current smokers, duration of smoking of ≥ 31 yr, amount of smoking of 21 to 30 cigarettes per day, and total cigarette index ≥ 35 were 4.05, 5.83, 5.58, and 7.24, respectively (Table 1). Compared with the results of the 10-year follow-up (7), the RR of current smoking was 4.0 with narrowed 95% confidence intervals.

Our results revealed that the risk of developing lung cancer relative to smoking habit did not change with a longer follow-up period in Korean men. Compared with the results of Doll et al. (3-5), we have two main considerations. The first is related to the effects of the change in smoking habits in the cohort participants during the follow-up periods. Because quitting smoking may result in an underestimation of the RR, using the smoking information gathered at the time of entry into the study would limit the interpretation. However, two reported facts would over-

Table 1. Adjusted relative risk (aRR*) and 95% confidence intervals (CI) of lung cancer relative to smoking habits with a 10-yr[†] and 16-yr follow-up in the Seoul Male Cancer Cohort Study[‡]

Variables	Incidents (n = 123)	Person-years (203,870)	aRR (16 yr)	aRR (10 yr)
Smoking status				
Never	8	45,803	1.0	
Past	18	53,986	1.13 [0.50, 2.59]	0.99 [0.33, 2.96]
Current	93	99,965	4.05 [2.08, 7.87]	4.18 [1.78, 9.81]
Duration of smoking (yr)				
0	10	53,911	1.0	
-10	3	10,986	1.18 [0.25, 5.44]	1.06 [0.12, 9.10]
-20	8	24,270	2.14 [0.82, 5.59]	2.38 [0.68, 8.29]
-30	38	73,749	2.61 [1.22, 5.58]	2.28 [0.82, 6.38]
31+	64	40,954	5.83 [2.84, 12.0]	6.97 [2.70, 17.9]
Amounts of daily smoking (cigarettes/day)				
0	11	52,238	1.0	
-10	0	17,656	-	-
-20	29	53,912	2.43 [1.17, 5.05]	2.85 [1.14, 7.17]
-30	60	62,295	4.12 [2.08, 8.17]	3.99 [1.65, 9.63]
31+	23	17,769	5.58 [2.58, 12.1]	4.79 [1.75, 13.1]
Total cigarette index (pack-year)				
0	8	48,632	1.0	
1-10	9	30,857	1.52 [0.61, 3.77]	1.76 [0.54, 5.77]
11-15	7	19,703	1.67 [0.61, 4.52]	1.99 [0.56, 7.10]
16-20	14	22,204	2.50 [1.06, 5.92]	3.16 [1.06, 9.46]
21-34	41	51,851	3.36 [1.69, 6.67]	3.20 [1.27, 8.08]
35+	40	20,394	7.24 [3.64, 14.4]	8.55 [3.46, 21.1]

*Adjusted for age at entry, intake of coffee, raw fish, tomatoes, and retinol; [†]Reference (7); [‡]All *P* values of chi-squares test for trends across the categories are < 0.001.

come this issue as follows: 1) the male British doctors that smoked cigarettes reported smoking the same amount at the beginning and half way through the study (4), and 2) the carcinogenic effect of smoking was presented after 20- to 25 yr (8). Second, it is necessary to consider the global difference of lung cancer occurrence in never-smokers. Thun et al. (9) concluded that Asians living in Korea and Japan had higher death rates from lung cancer than Europeans. This finding could explain why Korean men have lower risks of lung cancer relative to cigarette smoking than do British male doctors, but additional studies are needed to test this hypothesis.

In conclusion, the risk of lung cancer relative to cigarette smoking did not increase with a longer observation period in Korean men. Based on the aRR and the smoking prevalence of 0.41 in Korean adult men (10), the estimated percent of lung cancers attributable to cigarette smoking was 55.6%. These results highlight the need for an intervention program for quitting smoking in Korea.

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