Chronic Obstructive Pulmonary Disease as an Independent Risk Factor for Cancer

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BACKGROUND

Many studies have revealed a close association between chronic obstructive pulmonary disease (COPD) and cancer.

The fact that a high prevalence of COPD in elderly smokers may imply the association between COPD and cancer that depend on smoking history or age. The primary purpose of this study was to assess the existence of COPD is an independent risk factor for the development of cancer.

OBJECTIVES

Perform a matched case-control study based on the 2018 Behavioral Risk Factor Surveillance System (BRFSS).

- Eligible population in the study: smokers (smoked cigarettes more than 100 in their entire lives) aged or more than 40 years old.
- Case group: subjects developed cancer after 40 years old.
- Control group: subjects do not have cancer.

METHODS

Cancer cases were matched individually with cancer-free (control group) subjects on Age, Gender, Race, and Smoking Status at a 1:1 ratio.

Chi-square tests determine whether the prevalence of cancer cases in these variable groups was significantly different at the 0.05 level.

Conditional logistic regression estimates the association between cancer and COPD adjusting for education, income, exercises in the past 30 days, and drinking status.

RESULTS

Table 1. Descriptive Statistics for the Covariates between case and control Groups. 1:1 Case-Control matched by Age, Gender, Race, and Smoking Status.

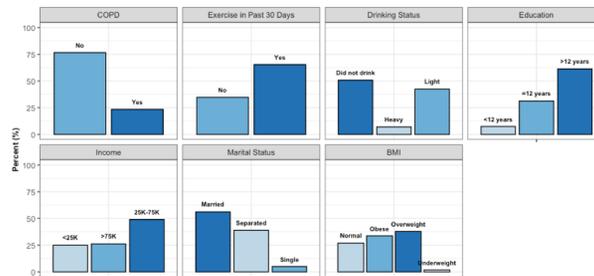| Variable	1:1 Case-Control Matched Population			Original Population (Unmatched)		
	Cancer Group (N=2,492)	Control Group (N=2,492)	P-value	Cancer Group (N=33,992)	Control Group (N=111,397)	P-value
COPD			<0.0001			<0.0001
Yes	575 (55.99)	452 (44.01)		7620 (30.09)	17703 (69.91)	
No	1889 (48.3)	2022 (51.7)		26149 (21.93)	93087 (78.07)	
Marital Status			0.1192			<0.0001
Married	1396 (51.14)	1334 (48.86)		17764 (23.34)	58345 (76.66)	
Separated	968 (48.96)	1009 (51.04)		14210 (25.27)	42018 (74.73)	
Single	121 (45.66)	144 (54.34)		1896 (15.19)	10585 (84.81)	
Education			0.6667			<0.0001
<12 years	183 (49.86)	184 (50.14)		2734 (20.25)	10767 (79.75)	
=12 years	779 (49.09)	808 (50.91)		9589 (21.08)	35897 (78.92)	
>12 years	1525 (50.48)	1496 (49.52)		21618 (25.1)	64525 (74.9)	
Income			0.176			<0.0001
Below 25K	513 (47.94)	557 (52.06)		29449 (78.23)	8194 (21.77)	
25K to 75K	1007 (50.86)	973 (49.14)		12540 (24.19)	39296 (75.81)	
Above 75K	538 (47.99)	583 (52.01)		7810 (22.31)	27194 (77.69)	
Exercise in Past 30 Days			0.0047			<0.0001
Yes	1621 (48.58)	1716 (51.42)		22916 (23.07)	76401 (76.93)	
No	862 (52.85)	769 (47.15)		11026 (24.04)	34831 (75.96)	
Drinking Status			0.0487			<0.0001
Did not drink	1234 (51.96)	1141 (48.04)		16298 (24.12)	51282 (75.88)	
Light	1032 (48.89)	1079 (51.11)		14313 (23.32)	47074 (76.68)	
Heavy	169 (46.81)	192 (53.19)		2396 (20.61)	9230 (79.39)	
BMI			0.2782			<0.0001
Underweight	41 (51.9)	38 (48.1)		667 (27.4)	1767 (72.6)	
Normal	648 (49.09)	672 (50.91)		9620 (24.67)	29373 (75.33)	
Overweight	909 (49.27)	936 (50.73)		12462 (24.09)	39260 (75.91)	
Obese	808 (52.2)	740 (47.8)		9994 (21.71)	36038 (78.29)	
	Baseline Variables					
Age			1			<0.0001
40-60 years	366 (50)	366 (50)		6317 (11.73)	47540 (88.27)	
60+ years	2126 (50)	2126 (50)		27675 (30.24)	63857 (69.76)	
Sex			1			<0.0001
Female	1207 (50)	1207 (50)		17359 (23.91)	55248 (76.09)	
Male	1283 (50)	1283 (50)		16578 (22.85)	55978 (77.15)	
Race			1			<0.0001
Other	93 (50)	93 (50)		1408 (15.91)	7443 (84.09)	
White	2248 (50)	2248 (50)		29942 (25.6)	86951 (74.39)	
Black	98 (50)	98 (50)		1370 (13.59)	8708 (86.41)	
Hispanic	15 (50)	15 (50)		733 (10.22)	6437 (89.78)	
Smoke			1			0.065
Smoked<1 year	14 (50)	14 (50)		207 (23.1)	689 (76.9)	
Smoked <20 years	144 (50)	144 (50)		2418 (23.95)	8120 (77.05)	
Smoked 20-76 years	226 (50)	226 (50)		3918 (24.17)	12292 (75.83)	

Fig 1.Demographic Characteristics of Cancer Patients Diagnosed after 40 years old, Matched by Age Age,Gender,Race and Smoking Status.

RESULTS

Table 2. Association Between COPD and Cancer Adjusted for Marital Status, Education, Income, BMI, Exercise and Drinking Status.(1:1 Case-Control Matched by Age, Race, Gender and Smoking Status)

	Parameter	Point Estimate	95% CI
COPD	*Yes vs. No*	2.17**	1.29- 3.65
Marital Status	*Single vs. Married*	0.67	0.27- 1.66
	Separated vs. Married	1.03	0.68- 1.57
Education	*<12 years vs. >12 years*	0.79	0.39- 1.59
	=12 years vs. >12 years	0.73	0.45- 1.17
Income	*25K - 75K vs. <25K*	1.27	0.76- 2.12
	>75K vs. <25K	1.10	0.58- 2.10
Exercise in Past 30 Days	*Yes vs. No*	1.03	0.68- 1.55
Drinking Status	*Heavy Drink vs. Do Not Nrink*	0.39*	0.15- 0.97
	Light Drink vs. Do Not Drink	0.73	0.49- 1.08
BMI	*Obese vs. Normal Weight*	1.09	0.67- 1.78
	Overweight vs. Normal Weight	0.92	0.57- 1.49
	Underweight vs. Normal Weight	0.30	0.06- 1.62

*p<0.05, **P<0.001

- Table1 indicated the prevalence of cancer cases among various demographic groups. 55.99% of subjects with COPD were diagnosed with cancer, while 48.30% of subjects without COPD were diagnosed with cancer.

- Fig 1 summarized the demographic characteristics of cancer cases in the case-control matched sample.

- Table 2 suggested the probability of having cancer for COPD patients was 2.17 times the probability of those who do not have COPD (P-value <0.001).

CONCLUSIONS

We found evidence of a strong association between COPD and cancer. Compared with smokers without COPD, the adjusted hazard ratios for cancer in smokers with COPD was 2.17 (95% CI: 1.29-3.65), implying that patients with COPD are at high risk of cancer, irrespective of smoking duration.