Original Article

The risk of pneumothorax in pneumoconiosis patients in Taiwan: a retrospective cohort study

Supplemental Material

Running title: Pneumothorax in Pneumoconiosis Patients

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Table S1. Multivariable Cox regression analysis of the factors contributing to pneumothorax in the study population.

Variables	HR [95% CI]	*P* value
Pneumoconiosis patients *vs.* Control subjects	3.05 [2.18-4.27]	<0.0001
Male *vs.* Female	4.46 [2.70-7.37]	<0.0001
Age > 65 *vs.* ≤65	1.59 [1.17-2.17]	0.0030
Residency (Northern Taiwan *vs.* Other areas)	0.74 [0.53-1.04]	0.0795
Higher income (>NT$24000) *vs.* lower income (≤NT$24000)	0.61 [0.39-0.96]	0.0324
Presence of underlying diseases:		
Heart disease	1.70 [0.93-3.10]	0.0868
Peripheral vascular disease	3.50 [1.39-8.80]	0.0078
Major neurological disorder	1.78 [1.15-2.75]	0.0098
Chronic pulmonary disease	2.42 [1.73-3.38]	<0.0001
Connective tissue disease	3.25 [1.31-8.07]	0.0111
Peptic ulcer disease	1.00 [0.65-1.55]	0.9876
Liver disease	1.31 [0.80-2.16]	0.2800
Diabetes mellitus	0.58 [0.31-1.10]	0.0931
Renal disease	1.21 [0.57-2.57]	0.6175
Cancer	1.30 [0.68-2.50]	0.4337

Abbreviation: NT$ = New Taiwan Dollar; HR = hazard ratio; CI = confidence interval.

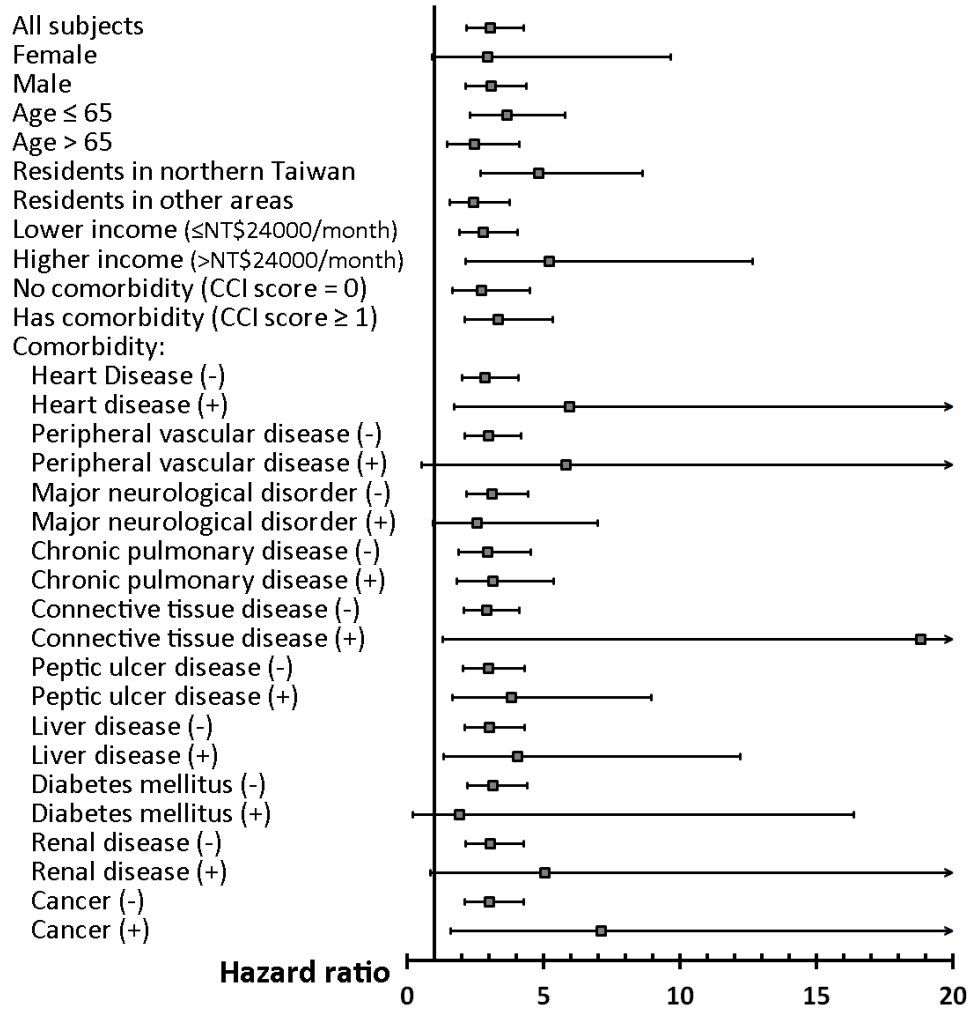

Figure S1. Stratified analyses of multivariable Cox regression analyses assessing the effect of pneumoconiosis on incident pneumothorax.

The results are presented with adjusted HRs (95% CI) of pneumoconiosis, which are adjusted for sex, age, residency, income level, and the presence of various comorbidities (except for the variable used for stratification).

*Abbreviations: CCI = Charlson Comorbidity Index; HR = hazard ratio; CI = confidence interval.

Table S2. Baseline characteristics of the propensity score (PS)-matched cohorts.

	All subjects	Pneumoconiosis	Control	P value
N	9675	1935	7740	
Sex, n (%)				
Female	2800 (29%)	560 (29%)	2240 (29%)	
Male	6875 (71%)	1375 (71%)	5500 (71%)	
Age (year), mean ± SD	56.7 ± 15.6	56.7 ± 15.6	56.7 ± 15.6	
Age (year), n (%)				
≤ 65	6622 (68%)	1323 (68%)	5299 (68%)	
> 65	3053 (32%)	612 (32%)	2441 (32%)	
Residency, n (%)				>0.99
Northern Taiwan	4315 (45%)	863 (45%)	3452 (45%)	
Other areas	5360 (55%)	1072 (55%)	4288 (55%)	
Monthly income (NT$), median (IQR)	19200 (0-21900)	19200 (0-21900)	19200 (0-21900)	0.5137
Monthly income (NT$), n (%)				0.3931
≤ 24000	7596 (79%)	1533 (79%)	6063 (78%)	
> 24000	2079 (21%)	402 (21%)	1677 (22%)	
CCI score, mean ± SD	0.5 ± 1	0.5 ± 1.1	0.5 ± 1	0.3092
CCI score, n (%)				0.5506
= 0	7038 (73%)	1389 (72%)	5649 (73%)	
= 1	1423 (15%)	292 (15%)	1131 (15%)	
≥ 2	1214 (13%)	254 (13%)	960 (12%)	
Underlying diseases, n (%)				
Heart disease	176 (2%)	42 (2%)	134 (2%)	0.1959
Myocardial infarction	49 (1%)	11 (1%)	38 (0%)	0.6674
Congestive heart failure	137 (1%)	31 (2%)	106 (1%)	0.4387
Peripheral vascular disease	42 (0%)	10 (1%)	32 (0%)	0.5362
Major neurological disorder	491 (5%)	96 (5%)	395 (5%)	0.7989
Cerebral Vascular disease	477 (5%)	96 (5%)	381 (5%)	0.9438
Dementia	24 (0%)	4 (0%)	20 (0%)	0.6827
Hemiplegia	41 (0%)	8 (0%)	33 (0%)	0.9376
Chronic pulmonary disease	1532 (16%)	306 (16%)	1226 (16%)	0.9778
Connective tissue disease	43 (0%)	7 (0%)	36 (0%)	0.5410
Peptic ulcer disease	874 (9%)	190 (10%)	684 (9%)	0.1778
Liver disease	512 (5%)	108 (6%)	404 (5%)	0.5249
Diabetes mellitus	458 (5%)	89 (5%)	369 (5%)	0.7557
Renal disease	120 (1%)	28 (1%)	92 (1%)	0.3583
Cancer	139 (1%)	31 (2%)	108 (1%)	0.4943

Abbreviation: NT$ = New Taiwan Dollar; CCI = Charlson Comorbidity Index; SD = standard deviation; IQR = interquartile range.

Table S3. Incidence rate of pneumothorax (PTX) after the index date in each propensity score (PS)-matched cohort.

	Pneumoconiosis				Control				IRR [95% CI]
	N	PTX	PY	IR	N	PTX	PY	IR	
All PS-matched subjects	1935	36	24639.4	1.5	7740	48	101849.3	0.5	3.1 [2.7-3.6]***
Stratified analyses									
Sex									
Female	560	1	8115.7	0.1	2240	5	32460.7	0.2	0.8 [0.5-1.2]
Male	1375	35	16523.7	2.1	5500	43	69388.6	0.6	3.4 [2.9-4.0]***
Age									
≤ 50	1323	22	18000.0	1.2	5299	25	74282.3	0.3	3.6 [3.1-4.3]***
> 50	612	14	6639.4	2.1	2441	23	27567.0	0.8	2.5 [2.0-3.2]***
Residents in									
Northern Taiwan	863	12	11836.9	1.0	3452	11	48460.0	0.2	4.5 [3.6-5.6]***
Other areas	1072	24	12802.5	1.9	4288	37	53389.2	0.7	2.7 [2.2-3.3]***
Monthly income									
≤ NT$24000	1533	29	19155.5	1.5	6063	45	78417.2	0.6	2.6 [2.3-3.1]***
> NT$24000	402	7	5483.9	1.3	1677	3	23432.0	0.1	10.0 [6.9-14.4]***
Comorbidity									
No (CCI score = 0)	1389	19	19330.8	1.0	5649	27	80127.9	0.3	2.9 [2.5-3.5]***
Yes (CCI score ≥ 1)	546	17	5308.6	3.2	2091	21	21721.4	1.0	3.3 [2.6-4.3]***

***p<0.0001

Abbreviation: NT$ = New Taiwan Dollar; CCI = Charlson Comorbidity Index;
N = number of patients; PTX = pneumothorax (number of patients);
PY = total patient-years;
IR = incident rate, as expressed as PTX incidence per 1000 patient-years;
IRR = incidence rate ratio; CI = confidence interval.

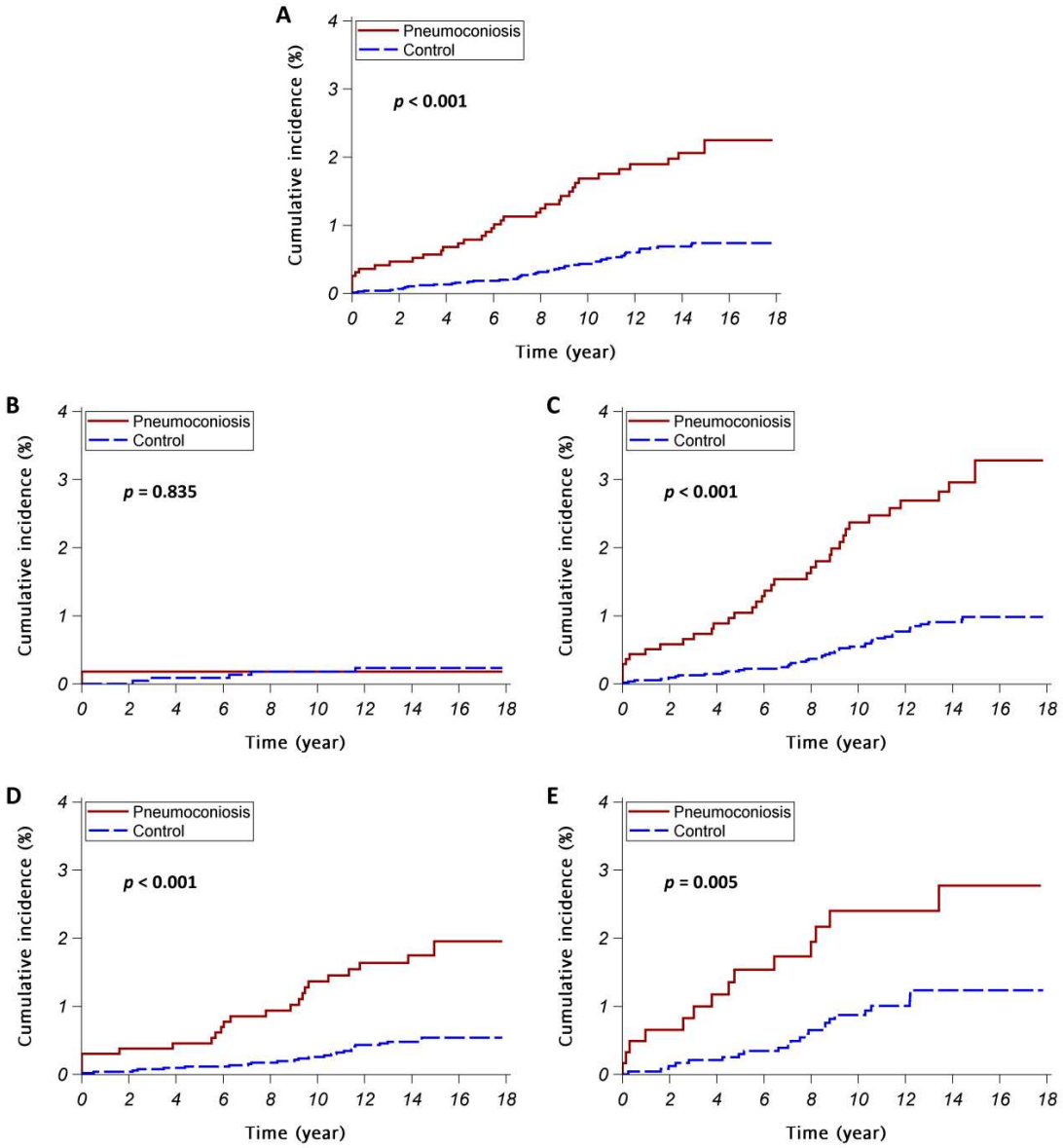

Figure S2. The cumulative incidences of pneumothorax in the propensity score (PS)-matched cohorts.

The red continuous lines and blue dashed lines show the cumulative incidence of pneumothorax for the pneumoconiosis patients and the control subjects respectively.
(a) all study subjects;
(b) female subjects; (c) male subjects;
(d) subjects aged ≤65 years; (e) subjects aged >65 years.

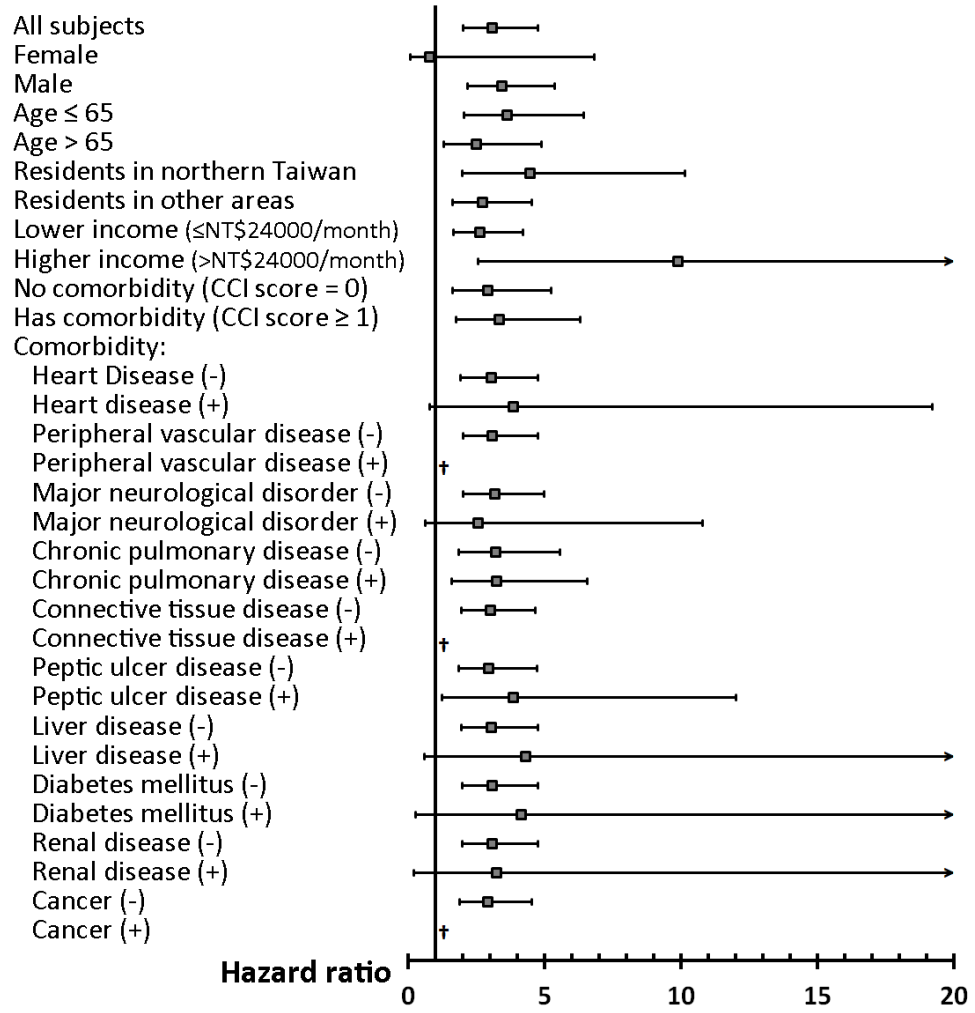

Figure S3. Stratified analyses of univariate Cox regression analyses assessing the effect of pneumoconiosis on incident pneumothorax in the propensity score (PS)-matched cohorts.

The results are presented with HRs (95% CI) of pneumoconiosis.

*Abbreviations: CCI = Charlson Comorbidity Index; HR = hazard ratio; CI = confidence interval.

†: Due to small sample size, hazard ratio cannot be estimated.

Table S4. Pneumoconiosis cases with pneumothorax reported from different countries and industries, available with patients' data.

Country	Author (year)	Occupation	Case number	Age	sex	Exposure		Smoking
						dust	duration	
Indonesia	Amanda G (2016)[1]	builder	1	39	M	silica	18	Y
India	Natarajan AS (1992) [2]	silica flour mill worker	1	28	M	silica	7	N
	Gupta KB (2006) [3]	stone cutting	1	26	M	silica	3	Y
	Fotedar S (2010) [4]	stone cutting	1	24	M	silica	4	N
	Bairagya T (2012) [5]	stone cutting	1	21	M	silica	4	Y
	Srivastava GN (2014) [6]	stone crusher	1	28	M	silica	1	N
	Mishra P (2014) [7]	well driller	1	33	M	silica	10	N
	Dixit R (2015) [8]	stone crusher	1	35	M	silica	2	N
	Sharma RK (2017)[9]	Stone mining	20 (50)	—	M(45), F(5)*	silica	10 (5-15)*	Y(30)*
	Bairwa MK (2019) [10]	stone crusher & cutting	20	38.6 (26-65)	M	silica	13.7 (5-24)	Y(15)
	Meena MK (2020) [11]	stone mining	22 (50)	38.70 (10.17) *	—	silica	13.8 (4.8)*	Y(38)*
Iran	Mohebbi I (2007) [12]	stone grinding	7 (21)	26.43 (5.85)	M*	silica	2.14 (1)	N*
Japan	Hasejima N (1995) [13]	beryllium-copper wire drawing	1	24	M	beryllium	—	—
	Handa T (2009) [14]	—	2 (10)	33 (24-40) *	M(4), F(6)*	beryllium	5.84 (1-10.4)*	—
	Kobashi Y (2003) [15]	—	1	46	M	silica	13	—
	Kurihara T (2014) [16]	—	1	71	M	asbestos	—	—
Brazil	Moreira MA (2010) [17]	saws and knives sharpener	1	27	M	Hard metal	8	Y
Turkey	Fidan F (2005) [18]	welding	1	23	M	Hard metal	8	Y
	Sahbaz S (2007) [19]	denim, sandblasting	2	Case 1: 23 Case 2: 25	M	silica	Case 1: 3 Case 2: 1.5	Case 1: Y Case 2: —
	Aydin Y (2010) [20]	—	2 (5)	18.6 (16-22)*	M*	silica	—	Y *
Belgium	Demoulin AS (2009) [21]	metal sandblasting	1	26	M	silica	5	Y
South Africa	Oni T (2015) [22]	gold miner	1	59	M	silica	16.5	Y
Korea	Yang HS (2014) [23]	glass blending	1	57	M	silica	20	Y
Morocco	Elidrissi AM (2016) [24]	well-digger	2 (54)	50 (34-82)*	M	silica	12.9*	Y(36)*
China	Zhang DH (2003) [25]	gem worker	5 (47)	—	—	silica	4.67(1.17)*	—
	Wu N (2020)[26]	Artificial Stone Natural stone	3 (18) 1 (63)	36.1 (9.6)* 52.8 (8.6)*	M* M(52), F(11)*	silica	6.4 (2.9)* 29.3 (11.7)*	Y(12)* Y(43)*
USA	Suratt PM (1977)[27]	tombstone sandblaster	4	36 (23-47)	M	silica	2.9 (1.6-5.3)	Y(4)
	Mindy J. (2002)[28]	Aluminum welder	1 (2)	43	M	Aluminum fume	24	Y

Cases are presented as pneumoconiosis with pneumothorax (total observation cases).
Age is presented as mean (SD or range); duration of exposure is presented in mean years (SD or range).
—, information not available or not stated; * data for all observed cases; Y( ), yes(case number); N, not used.

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