



IF: 0.925

Asian Pacific Journal of Tropical Medicine

journal homepage: www.apjtm.org



doi: 10.4103/1995-7645.231472

©2018 by the Asian Pacific Journal of Tropical Medicine. All rights reserved.

## The risk factors for chronic obstructive pulmonary disease in Li and Han ethnic groups in Hainan, China

Li Lin<sup>1#</sup>, Duo-Yi Wu<sup>2#</sup>, Ping He<sup>2</sup>, Quan-Ni Li<sup>2</sup>, Long-He Li<sup>2</sup>, Jian-Nan Chen<sup>2</sup>, Huan Niu<sup>2</sup>, Yi-Peng Ding<sup>2✉</sup>

<sup>1</sup>Department of Geriatrics, the Second Affiliated Hospital of Hainan Medical University, Haikou, Hainan, 570311, China

<sup>2</sup>Department of Emergency, Hainan General Hospital, Haikou, Hainan, 570311, China

### ARTICLE INFO

#### Article history:

Received 13 January 2018

Revision 10 February 2018

Accepted 8 March 2018

Available online 2 April 2018

#### Keywords:

Chronic obstructive pulmonary diseases (COPD)

Li ethnicity

Risk factors

### ABSTRACT

**Objective:** To investigate the risk factors of chronic obstructive pulmonary disease (COPD) in Li and Han ethnic group in Hainan, China. **Methods:** All subjects were randomly selected from various regions in Hainan. General characteristics were compared between COPD cases and healthy control cases in both Li and Han ethnic groups. The odds ratio (OR), the corresponding 95% confidence interval (CI) of COPD were calculated by logistic regression. **Results:** A total of 277 Li COPD cases, 307 Li healthy control subjects, 290 Han COPD cases and 301 Han healthy control were included in this study. In both the Li and Han groups, the average age exceeded 65 years, and the cigarette number smoked per day and the smoking duration were correlated with risk of COPD. In the Li COPD subjects, low weight, smoking, and recurrent infection of respiratory tract were mainly risk factors; while the mainly risk factor of Han COPD subjects was family history of respiratory disease. **Conclusions:** The risk factors are different in COPD subjects of Han and Li nationalities in Hainan of China. The age and smoking are strongly correlated with COPD risk.

## 1. Introduction

Chronic obstructive pulmonary diseases (COPD) is currently found one of the most prominent lung diseases with a high and increasing morbidity and mortality worldwide[1]. It was reported that COPD would become a globally main death cause by 2030, and the number of deaths caused by COPD would increase by 30% in the next 10 years if the risk factors were not controlled[2]. In China, the COPD prevalence rate among adults over 40 years old is 8.2%, and COPD will cause more than 1 000 000 human deaths and 5 000 000 disabilities each year[3,4]. With the environmental pollution increasing recently in China, the COPD incidence and mortality also are increasing with age.

The COPD risk factors vary in different geographic regions. Smoking, gender, prior chronic lung diseases, and environmental factors such as occupational exposure to dust, were also considered as risk factors of COPD[5-12]. However, few studies have focused on COPD risk factors for minority people in China, which is a multi-ethnic country.

As the second biggest island and southernmost coast province of China, Hainan has a multiethnic character, where Li and Han are the two main ethnic populations in Hainan provinces. Li people lived in the mountains of the tropics for generations, and rarely got married with the outsider. Therefore, the case-control study was used to investigate the risk factors of COPD in the Chinese Han and Li nationalities.

<sup>#</sup>Li Lin and Duo-Yi Wu contributed equally to this work.

First author: Li Lin, Department of Geriatrics, the Second Affiliated Hospital of Hainan Medical University, Haikou, Hainan, 570311, China.

Duo-Yi Wu, Department of Emergency, Hainan General Hospital, Haikou, Hainan, 570311, China.

✉Corresponding author: Yi-Peng Ding, Department of Emergency, Hainan General Hospital, Mailbox #19 Xiuhua Road, Haikou, Hainan, 570311, People's Republic of China.

Tel: +86 18976335858

E-mail: ypding@263.net

Foundation project: This article was financially supported by the National Natural Science Foundation of China (No. 81160008 and 81660013).

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: reprints@medknow.com

©2018 Asian Pacific Journal of Tropical Medicine Produced by Wolters Kluwer- Medknow

**How to cite this article:** Lin L, Wu DY, He P, Li QN, Li LH, Chen JN, et al. The risk factors for chronic obstructive pulmonary disease in Li and Han ethnic groups in Hainan, China. Asian Pac J Trop Med 2018; 11(4): 305-308.

## 2. Materials and methods

### 2.1. Study subjects

Li and Han subjects were randomly selected from various regions in Hainan that are heavily inhabited by people of these nationalities, including southern regions such as Sanya ( $n = 929$ ) and Lingshui ( $n = 971$ ), central regions such as Wuzhishan ( $n = 786$ ), Baisha ( $n = 2 637$ ), Qiongzong ( $n = 803$ ) and Baoting ( $n = 2 449$ ), and western regions such as Dongfang ( $n = 1 003$ ), Danzhou ( $n = 1 186$ ), Ledong ( $n = 1 325$ ) and Changjiang ( $n = 4 475$ ). The descendants of intermarriages in the past three generations were excluded from this study. A total of 130 502 subjects were selected. Simple random sampling was used, and a total of 5 463 Li subjects and 6 078 Han subjects, who were long-term residents of the Li and Han people in Hainan, aged from 2 to 90, were initially included. Of these participants, a total of 277 Li cases and 290 Han cases were diagnosed with COPD by spirometry tests and subsequently enrolled in the study. Healthy controls were randomly selected from the healthy participants of the same regions. Of the 5 186 healthy Li participants and the 5 788 healthy Han participants, 307 and 301 were selected randomly as controls for analyses of statistics, respectively. In the final analysis, 277 cases of COPD and 307 Li healthy control subjects, 290 Han COPD cases, and 301 Han subjects of control were included in the study. The study has been approved by the medical ethics committee of the Hainan General Hospital.

### 2.2. Data collection

Before the study, each subject was asked to sign an informed consent and then a scheduled questionnaire was designed to collect data as following: 1) general characters, including sex, work, age, etc; 2) lifestyle, including smoking, alcohol consumption, and history of work; 3) information on diet; 4) family history, including respiratory diseases in parents, children and brothers and sisters; 5) body mass index (BMI) and other physical characteristics, including height, weight, waist circumference and hip circumference were calculated or measured by trained observers, and the mean of the two measurements was utilized in the analysis.

### 2.3. Diagnostic criteria of COPD

All participants were measured using spirometry by a portable spirometer (which meets the recommendation of the American Thoracic Society). Every participant needed 3 reproducible blows at least, and got the largest values as forced expiratory volume in one second (FEV1) and forced vital capacity (FVC) for analysis. The ratio of FEV1/FVC (FEV1%) was collected for all subjects.

The level of FEV1/FVC ratio 0.7 was an index for bronchodilator test. Some participants with tuberculosis, bronchiectasis, asthma, and recent lung infection within 4–6 weeks were excluded. All selected subjects had taken a bronchodilator test. The diagnosis of all COPD patients was accordance with “Global Initiative for Chronic Obstructive Lung Disease”(criteria established by the National Heart, Lung, and Blood Institute/WHO)[13].

### 2.4. Statistical analysis

Data such as continuous variables were analyzed by mean and standard deviation while categorical variables were analyzed by percentage. General characteristics between the Han and Li case and control groups were compared by using a *Chi*-square test and *t*-test. The age, sex, drinking, and smoking status were used to adjust multivariate *OR*s. The SPSS statistical software 19.0 was used to analyze all statistical data. The *P*-values were two-tailed and  $P < 0.05$  were considered statistically significant.

## 3. Results

### 3.1. Basic characteristics of study participants

A total of 584 Li subjects include 277 COPD cases and 307 healthy cases, while the 591 Han subjects include 290 COPD cases and 301 healthy cases. The general characteristics between case group and control group in Chinese Han and Li subjects were compared respectively (Table 1). In Chinese Han nationality, age, gender, recurrent respiratory tract infections and the family history of respiratory disease were significantly different between COPD cases and control cases ( $P < 0.05$ ); while in Chinese Li nationality, age, BMI value, the age of first smoking, duration of smoking, respiratory rate, pulse rate, and recurrent respiratory tract infections were significantly different between COPD cases and control cases ( $P < 0.05$ ). In general, the COPD cases were older than healthy cases and showed a slightly lower BMI. In our study, we also found that the number of elderly subjects with COPD was significantly larger than that of healthy subjects. The underweight case number of COPD was also significantly larger than that of healthy subjects.

### 3.2. Logistic analysis on association between risk factors and prevalence of COPD

Logistic regression was used to analyze association of prevalence and risk factors of COPD (Table 2). It was shown that smoking intensity (more than 5 cigarettes/d) biomass smoke, age (65 years and above), and low BMI were risk factors for COPD and were positively associated with the prevalence of COPD.

**Table 1**

General characteristics between case and control group in Chinese Han and Li subjects.

Variables	Han (n=591)		P-values	Li (n=584)		P-values
	Cases (n=290)	Control (n=301)		Cases (n=277)	Control (n=307)	
<sup>a</sup> Age (years)	72.06±10.77	64.01±13.88	<0.001	69.57±10.05	57.51±13.38	<0.001
<sup>b</sup> Sex (male, %)	76.1	58.2	<0.001	50.5	45.9	0.282
<sup>a</sup> BMI value	20.35±3.39	20.66±3.44	0.271	20.16±3.15	21.44±3.03	<0.001
<sup>a</sup> Age of first smoking (year)	22.98±7.96	22.36±6.77	0.525	25.70±11.03	20.14±6.43	<0.001
<sup>a</sup> Duration of age (year)	56.04±12.24	54.31±10.90	0.531	55.15±17.23	46.62±13.71	<0.001
<sup>a</sup> Duration of smoking (year)	37.08±13.43	35.92±13.94	0.502	37.32±15.26	24.92±15.09	<0.001
<sup>a</sup> Duration of cessation (year)	17.72±12.55	14.96±10.41	0.169	16.08±13.46	15.66±10.78	0.898
<sup>a</sup> Respiratory rate(times/second)	22.21±2.43	19.11±1.48	<0.001	19.63±2.97	18.66±1.54	<0.001
<sup>a</sup> Pulse rate (times/second)	86.25±11.72	80.83±9.16	<0.001	84.14±12.20	80.47±7.05	<0.001
Recurrent respiratory tract infections						
No	27	220		10	174	
1-3 times/year	139	60		133	103	
3-5 times/year	66	14		66	17	
<sup>b</sup> More than 5 time/year	59	7	<0.001	67	13	<0.001
Family history of respiratory disease						
No	298	185		264	300	
<sup>b</sup> Yes	3	44	<0.001	7	5	0.562

<sup>a</sup>P values was calculated by *t* tests; <sup>b</sup>P values was calculated by *Chi*-square tests.**Table 2**

Logistic analysis on association between risk factors and prevalence of COPD.

Variables	Han		P-values	Li		P-values
	OR	95%CI		OR	95%CI	
BMI						
Normal	1	-	-	1	-	-
Low weight	1.092	0.756-1.579	0.639	2.619	1.726-3.972	0.000
Overweight	0.721	0.442-1.175	0.189	0.609	0.373-0.992	0.047
Age						
<65	1	-	-	1	-	-
65	3.353	3.353-4.815	0.000	5.360	3.760-7.643	0.000
Smoking						
Never	1	-	-	1	-	-
Less than 5 per day	1.962	0.737-5.222	0.177	0.748	0.177-3.172	0.694
5-10 per day	2.769	1.449-5.294	0.002	1.746	0.546-5.590	0.348
11-20 per day	4.621	2.633-8.108	0.000	1.871	1.056-3.316	0.032

#### 4. Discussion

Hainan, located in the tropical region with high levels of pollen, has an increased prevalence of allergic diseases. The Li ethnic group, an indigenous people of Hainan, is a main ethnic minority group, with a population of 1.2 million. Having lived in mountains for generations, the Li people have been frequently exposed to pollen and other allergens. In addition, the lifestyles of the Han and Li people are significantly different. Thus, the potentially different risk factors between Chinese Han and Li COPD subjects are worth investigating. In this study, we found that COPD risk factors were different in Han and Li nationalities subjects of China. In Han subjects, age, smoking, duration of cigarette smoking, recurrent infections of respiratory tract, and respiratory disease family history were risk factors of COPD. In Li subjects, we found that the low

body weight was also a risk factor, but did not find significant association between family history of respiratory disease and risk of COPD.

In the past decades, many studies have proved that smoking is the main risk factor of COPD[14,15]. In this study, we also found that smoking and long-term smoking were the main risk factors of COPD in both the Han and Li subjects. To this end, increasing evidence indicates that smoking is an important risk factor for COPD[16-18].

Although the leading risk factor of COPD is smoking, Eisner *et al*[19] indicated that the burden of COPD in public health terms is also attributable to other risk factors other than smoking. Thus, to reduce COPD prevalence, we should focus not only on reducing exposure to smoking, but also on the less well-recognized risk factors. In our study, BMI and age were also found to be associated with the COPD risk. The COPD risk in subjects older than 65 was higher than that in subjects less than 65 years old in Chinese Han and Li subjects. However, we only found that low weight was related to increased COPD risk. Many previous studies showed that age is also a strong risk factor for COPD[20-22] and COPD risk would gradually increase with age[23]. BMI was shown to be correlated with disease progression among COPD patients. Recently many reports showed that obesity (especially abdominal adiposity) can increase the COPD risk[24,25]. However, a limited number of prior studies[26,27] based the relatively small samples also showed a negative correlation between BMI and COPD, which is consistent with the results of our study.

There were also some limitations in this study. Firstly, the sample size was not large enough in our study, so we need a larger sample sizes and more nationalities to involve in the future study. Secondly, the socioeconomic status may be different between Han and Li, which was not considered in the study.

In conclusion, we found that the risk factors of COPD were different in Chinese Han and Li nationality subjects. In Han subjects, age, smoking, duration of cigarette smoking, repeated

infections of respiratory tract and family history of respiratory disease are risk factors of COPD. Low body weight was also a risk factor in Li COPD subjects, whereas no significant association was found between family history of respiratory disease and COPD risk .

### Conflict of interest statement

The authors declare there is no conflict of interest.

### Acknowledgment

The authors want to thank National Natural Science Foundation of China for the support to this study (No. 81160008 and 81660013).

### References

- [1] Asker S, Ozbay B, Ekin S, Yildiz H, Sertogullarindan B. Two-year survival of severe chronic obstructive pulmonary disease subjects requiring invasive mechanical ventilation and the factors affecting survival. *J Pak Med Assoc* 2016; **66**(5): 498-503.
- [2] López-Campos JL, Tan W, Soriano JB. Global burden of COPD. *Respirology* 2016; **21**(1): 14-23.
- [3] Chan KY, Li X, Chen W, Song P, Nwk W, Poon AN, et al. Prevalence of chronic obstructive pulmonary disease (COPD) in China in 1990 and 2010. *J Glob Health* 2017; **7**(2): 020704.
- [4] Yin P, Wang H, Vos T, Li Y, Liu S, Liu Y, et al. A subnational analysis of mortality and prevalence of COPD in China from 1990 to 2013. *Chest* 2016; **150**(6): 1269-1280.
- [5] Su HL, Hwang ED, Ju EL, Moon S, Kang YA, Ji YJ, et al. The risk factors and characteristics of COPD among nonsmokers in Korea: an analysis of KNHANES IV and V. *Lung* 2016; **194**(3): 1-9.
- [6] Duan S, Peopleshospital G. An epidemiological investigation and risk factors analysis of COPD in a Wuwei population. *Foreign Med Sci* 2017; **7**(1): 32-34.
- [7] Guillien A, Puyraveau M, Soumagne T, Guillot S, Rannou F, Marquette D, et al. Prevalence and risk factors for COPD in farmers: a cross-sectional controlled study. *Eur Respir J* 2016; **47**(1): 95-103.
- [8] Kraïm-Leleu M, Lesage FX, Drame M, Lebagry F, Deschamps F. Occupational risk factors for COPD: a case-control study. *PLoS One* 2016; **11**(8): e0158719.
- [9] Abbasi M, Zohal M, Atapour B, Yazdi Z. Prevalence of osteoporosis and its risk factors in men with COPD in Qazvin. *Int J Chronic Dis* 2016; **2016**: 4038530.
- [10] Obeidat M, Li X, Burgess S, Zhou G, Fishbane N, Hansel NN, et al. Surfactant protein D is a causal risk factor for COPD: results of Mendelian randomisation. *Eur Respir J* 2017; **50**(5): 1700657.
- [11] Yohannes AM, Leroi I. Treat the brain to improve the lungs?: Mental illness as a risk factor for readmission in COPD. *Chest* 2016; **149**(4): 887-888.
- [12] Zagaceta J, Bastarrika G, Zulueta JJ, Colina I, Alcaide AB, Campo A, et al. Prospective comparison of non-invasive risk markers of major cardiovascular events in COPD patients. *Respir Res* 2017; **18**(1): 175.
- [13] Vogelmeier CF, Criner GJ, Martinez FJ, Anzueto A, Barnes PJ, Bourbeau J, et al. Global strategy for the diagnosis, management, and prevention of chronic obstructive lung disease 2017 Report: GOLD executive summary. *Am J Respir Crit Care Med* 2017; **195**(5): 557-582.
- [14] Koblizek V, Milenkovic B, Barczyk A, Tkacova R, Somfay A, Zykov K, et al. Phenotypes of COPD patients with a smoking history in Central and Eastern Europe: the POPE Study. *Eur Respir J* 2017; **49**(5): 1601446.
- [15] Olloquequi J, Silva OR. Biomass smoke as a risk factor for chronic obstructive pulmonary disease: effects on innate immunity. *Innate Immun* 2016; **22**(5): 373-381.
- [16] Li L, Zhang M, Zhang L, Cheng Y, Tu X, Lu Z. Klotho regulates cigarette smoke-induced autophagy: implication in pathogenesis of COPD. *Lung* 2017; **195**(3): 295-301.
- [17] Shukla SD, Muller HK, Latham R, Sohal SS, Walters EH. Platelet-activating factor receptor (PAFr) is upregulated in small airways and alveoli of smokers and COPD patients. *Respirology* 2016; **21**(3): 504-510.
- [18] Wain L, Shrine N, Miller S. Novel insights into the genetics of smoking behaviour, lung function, and chronic obstructive pulmonary disease (UK BiLEVE): a genetic association study in UK Biobank. *Lancet Respir Med* 2015; **3**(10): 769-781.
- [19] Eisner M, Anthonisen N, Coultas D, Kuenzli N, Perezpadilla R, Postma D, et al. Committee on Nonsmoking COPD, Environmental and Occupational Health Assembly.: An official American Thoracic Society public policy statement: novel risk factors and the global burden of chronic obstructive pulmonary disease. *Am J Respir Crit Care Med* 2010; **182**(5): 693-781.
- [20] Chan HP, Mukhopadhyay A, Chong PLP, Chin S, Wong XY, Ong V, et al. RRole of BMI, airflow obstruction, St George's Respiratory Questionnaire and age index in prognostication of Asian COPD. *Respirology* 2017; **22**(1): 114-119.
- [21] Holloway JW, Hodgekiss C, Roberts G, Karmaus W, Zhang H, Ewart S, et al. Fixed airways obstruction in smokers at 26 years of age; an early indication of COPD? *J Allergy Clin Immunol* 2018; **141**(2): AB8.
- [22] Kim SJ, Lee J, Park YS, Lee CH, Yoon HI, Lee SM, et al. Age-related annual decline of lung function in patients with COPD. *Int Chron Obstruct Pulmon Dis* 2016; **11**: 51-60.
- [23] Jaswal S, Saini V, Kaur J, Gupta S, Kaur H, Garg K. Association of adiponectin with lung function impairment and disease severity in chronic obstructive pulmonary disease. *Int J Appl Basic Med Res* 2018; **8**(1): 14-18.
- [24] Abston E, Comellas A, Reed RM, Kim V, Wise RA, Brower R, et al. Higher BMI is associated with higher expiratory airflow normalised for lung volume (FEF25-75/FVC) in COPD. *BMJ Open Respir Res* 2017; **4**(1): e000231.
- [25] Behrens G, Matthews CE, Moore SC, Hollenbeck AR, Leitzmann MF. Body size and physical activity in relation to incidence of chronic obstructive pulmonary disease. *CMAJ* 2014; **186**(12): E457-E469.
- [26] Liu JW, Lin TC, Chang YT, Tsai CA, Hu SY. Prostatic abscess of *Klebsiella pneumoniae* complicating septic pulmonary emboli and meningitis: A case report and brief review. *Asian Pac J Trop Med* 2017; **10**(1): 98-100.
- [27] Alshammari EMA, Mandal RK, Wahid M, Dar SA, Jawed A, Areeshi MY, et al. Genetic association study of P2x7 A1513C (rs 3751143) polymorphism and susceptibility to pulmonary tuberculosis: A meta-analysis based on the findings of 11 case-control studies. *Asian Pac J Trop Med* 2016; **9**(12): 1126-1134.