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Screening effect and risk factors of lung cancer with low dose CT

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Abstract: To analyze the effect of low-dose CT screening for lung carcinoma and the risk factors associated with lung carcinoma. A total of 568 asymptomatic sufferers who underwent low-dose CT screening for lung carcinoma were regarded, and based on the screening results, they were divided into positive group (n=67) and negative group (n=501), and the risk factors related to lung cancer were analyzed by multivariate Logistic regression. 67 cases (11.79%) were positive for low and medium dose CT screening. Among the 67 positive sufferers, 50 were confirmed as lung carcinoma by pathological biopsy. Multivariate logistic regression analysis showing that age ≥55, low education level and smoking history were associated with lung carcinoma ($P < 0.05$).So low-dose CT can effectively screen for lung cancer, and age ≥55 years old, low education level and smoking history are independent risk factors for lung cancer. This group could be regarded as the high-risk group for lung carcinoma, so as to better guide the development of low-dose CT screening for lung carcinoma.

1. Introduction

Lung carcinoma is a malignant tumor originating from trachea, bronchus and lungs, with high clinical morbidity and mortality [1-2]. However, most patients in the early stage of lung carcinoma have no obvious symptoms, and only by accurate screening could timely formulate targeted treatment plans to improve the prognosis of lung carcinoma sufferers. Recently, with the deepening of lung carcinoma sift, low-dose CT has been gradually applied in screening work. Low-dose CT has the characteristics of simple operation, rapid examination and high resolution, which can further improve the accuracy of lung carcinoma sift [3-4].However, due to the heavy workload and complexity of lung carcinoma sift, to further improve the pertinency of low-dose CT sift for lung carcinoma, it is necessary to understand the risk factors related to the occurrence of lung carcinoma, so as to further identify high-risk groups for lung carcinoma, and thus improve the accuracy and efficiency of sift [5]. Based on this, this study selected 568 asymptomatic sufferers who underwent low-dose CT screening for lung carcinoma in our hospital from February 2018 to May 2021 as research objects, aiming to analyze the screening effect of low-dose CT for lung carcinoma and the risk factors related to lung carcinoma, as reported below.

2. Data and Methods

Clinical data A total of 568 asymptomatic sufferers who underwent low-dose CT sift for lung carcinoma in our hospital from February 2018 to May 2021 were regraded as study subjects, and were divided into positive one (low-dose CT positive, n=67) and negative group (low-dose CT negative, n=501) according to the screening results. Our study has been reviewed and approved by the Ethics Committee of our hospital. Inclusion criteria: ① Complete clinical data; ② Those who can complete the questionnaire by themselves; ③ Patients without CT contraindications; (4) All sufferers and their family member gave informed consent to this research and signed informed consent. Exclusion criteria: ① Sufferers with other tumors; ② Patients with a history of tuberculosis; ③ Poor CT image quality.

Methods All 568 asymptomatic subjects received low-dose CT for lung carcinoma sift. The specific methods were as follows: Before screening, medical staff should carry out routine health selection to enhance the cooperation of the subjects. At the same time, the general information of the sufferers was investigated, including gender, age, education level, family living environment (with or without second-hand smoking exposure history), working environment (with or without second-hand smoking exposure history), smoking and family history of carcinoma. After the completion of the investigation, the above information should be strictly reviewed to avoid the occurrence of missing and wrong filling, so as to ensure the accuracy of the survey data. After the investigation was completed, the sufferer was examined by spiral CT (PHILIPS Access), and the patient was instructed to choose supine position. The tube voltage was set at 120 kV, tube current at 17 mAs, pitch at 0.9 mm, FOV at 350 mm×350 mm, layer thickness at 1.0 mm, and layer spacing at 0.5 mm. Detector collimation width 128mm× 0.625mm. During the examination, the patient is asked to raise both upper limbs above his head and scan the tip of the lung to the bottom of the lung. A single breath holding scan is performed at the end of the inhalation. The positive criteria of low-dose CT were solid or partially solid nodules ≥5 mm and non-solid nodules ≥8 mm.

Statistical methods SPSS 20.0 statistical software was used for analyzing data. The statistical data were represented by [n (%)], $\chi 2$ test was used, and multivariate analysis was performed by Logistic regression. $P < 0.05$ was considered statistically obvious.

3. Results

Table 1: Univariate analysis of the two group

Clinical data		positive group	negative group	$^2/F$	P
gender	Male	40(60.00)	320(63.20)	0.12	>0.05
	Female	27(40.00)	181(36.80)		
age	<55	13(19.40)	341(68.06)	32.12	<0.05
	≥55	54(80.60)	160(31.94)		
education level	below junior middle school	43(64.17)	65(12.97)	31.24	<0.05
	Junior high school	9(13.43)	130(25.94)		
	senior high school	9(13.43)	141(28.14)		
	above high school	6(8.96)	165(32.93)		
second-hand smoking exposure history	yes	37(55.22)	276(55.09)	0.11	>0.05
	no	30(44.78)	225(44.91)		
smoking	yes	51(76.12)	230(45.91)	48.23	<0.05
	no	16(23.88)	271(54.09)		
family history of cancer	yes	32(47.76)	254(50.69)	0.47	>0.05
	no	35(52.24)	247(49.31)		

3.1 Univariate Analysis

568 asymptomatic subjects showed that 67 patients (11.79%) were positive in low-dose CT screening. 501 cases were negative, the negative rate was 88.21%. Of the 67 positive patients, 50 were confirmed to be lung cancer by pathological biopsy. By univariate analysis, it had no obvious distinctions in sex, family secondhand smoking exposure history, work secondhand smoking exposure history and family tumor history between positive and negative groups. It had statistically obvious distinctions in age, education level and smoking history between the positive and negative groups ($P < 0.05$), as shown in Table 1.

3.2 Multivariate Logistic Regression Analysis

The univariate analysis showing that age ≥55 years old, low education level and smoking history were possible risk factors for lung cancer. The above variables were analyzed by multivariate Logistic regression analysis, and the outcomes showing that: Age ≥55 years, low education, and a history of smoking are independent risk factors for lung cancer, as shown in Table 2.

Table 2: Multivariate logistic regression analysis of the selected variables

factors	*β*	*SE*	Wald	*P*	*OR*	95%*CI*
age	0.09	0.20	5.30	0.02	1.21	1.10~2.34
education level	0.15	0.36	7.38	0.01	3.19	1.17~7.54
Smoking history	0.12	0.31	6.24	0.01	3.14	1.06~7.40

4. Discussion

Lung carcinoma is one of the pernicious tumors with high clinical frequency and fatality rate, and its pathogenesis has not been clearly defined. However, many medical practitioners believe that the occurrence of lung carcinoma is relevant to smoking, air pollution, diet, heredity and other factors [6-7]. According to epidemiological investigation, the incidence of lung carcinoma accounts for 13.0% of all tumors, and the frequency of lung carcinoma in China has been on the rise in recent years [8]. It can be seen that lung cancer is a serious threat to the physical and mental health of Chinese residents. In order to detect lung carcinoma early and improve the prognosis of patients, clinical screening is of great significance. In recent years, with the further development of CT technology, low-dose CT has become one of the main screening methods for lung cancer. The results show that lung cancer has a high incidence, and low dose CT can accurately screen lung carcinoma. Low-dose CT is an effective, non-invasive and rapid means of examination, which can conduct a comprehensive scan from the lung tip to the lung base of patients, clearly display the tissue structure of the lungs, and facilitate clinical screening physicians to find pathological tissues [9-10]. At the same time, low-dose scanning can effectively reduce the effect of contrast agents on the sufferer's body, and it is suitable for lung carcinoma sift.

Although low-dose CT can effectively screen for lung carcinoma, due to the heavy screening workload, in order to improve the specificity of lung carcinoma sift with low-dose CT, it is necessary to grasp the relevant risk factors of lung carcinoma sufferers, so as to carry out preliminary screening by dividing high-risk groups and providing guidance for effectively carrying out lung carcinoma sift with low-dose CT. In this study, single factor analysis showed that age ≥55years old, low education level and smoking history were possible risk factors for lung cancer. Multivariate Logistic regression analysis was conducted on the above variables, and the results showed that age ≥55 years old, low education level and smoking history were independent risk factors for lung carcinoma. Age≥55 years: as a risk factor for lung cancer, middle-aged and elderly

people are mainly due to the gradual decline of various body functions with the increase of age, especially the function of the immune system, which leads to respiratory system lesions and lung cancer. Middle-aged and elderly people have a higher incidence of lung diseases if they live in places with heavy air pollution or are exposed to second-hand smoke for a long time. Low education level: people with low education level have incomplete understanding of lung cancer related knowledge, which leads to low attention to lung cancer prevention and physical examination, which increases the potential risk of lung cancer. Meanwhile, people with low education level generally live in rural areas and receive insufficient lung cancer knowledge, which makes them pay less attention to lung cancer screening and increase the risk of lung cancer. Smoking history: smoking is one of the main causes of lung cancer. Cigarettes contain about 300 carcinogens, such as nicotine, carbon monoxide, and radioactive elements. These three groups of people can be used as the high-risk population of LDCT lung cancer screening, so as to achieve early detection, early diagnosis and early intervention as far as possible. In addition, in the work of lung carcinoma screening, it is necessary to increase the publicity of relevant lung cancer prevention knowledge, popularize the harm of smoking, in order to reduce the contact with the pathogenesis of lung carcinoma. For patients diagnosed with lung cancer, effective treatment and intervention should be given in time to improve their prognosis. Doctors advise patients to go to less crowded places with serious air pollution, rationally arrange work and rest, improve the working and living environment, and avoid inhaling harmful substances such as dust as much as possible, promoting lung cancer awareness and help-seeking and early detection.

In conclusion, low-dose CT can effectively screen for lung cancer, and age ≥55 years old, low education level and smoking history are independent risk factors for lung carcinoma. This group of people can be regarded as a high-risk group for lung carcinoma, so as to further improve the efficiency of low-dose CT sift for lung carcinoma.

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