

Original Research Article

Study the frequency of bronchial anthracosis and its influencing factors in patients undergoing bronchoscopy in Ardabil city hospital, 2013-2015

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ABSTRACT

Background: Bronchial anthracosis is defined as appearance of multiple dark anthracotic pigmentations on large airway mucosa with or without airway narrowing or obliteration. This study aims to investigate the frequency of bronchial anthracosis and its influencing factors in patients undergoing bronchoscopy.

Methods: In this cross-sectional study, data was obtained from reviewing the files of 900 patients who underwent bronchoscopy in Ardabil city Hospital. Those with dark pigmentation on their airways mucosa were considered as having bronchial anthracosis. During bronchoscopy, samples were collected from the airways in the form of bronchoalveolar lavage and then the smear and culture of these samples were examined for acid fast bacilli. Type of fuel used for cooking in the kitchen and for heating in their house, history of smoking, the patient's geographical location and occupation were recorded by a checklist and then evaluated.

Results: Of 900 cases, 42 (4.6%) had bronchial anthracosis, out of which 23 (55%) were male and most were in urban areas. Majority of patients were in the age range of 60 to 70 years. Of 11 farmers with anthracosis, 7(6.63%) patients used fossil fuels for heating. Among the anthracosis patients, 11 (21.2%) subjects had Tuberculosis. There was a significant difference between age, habitant of patients, pulmonary tuberculosis and bronchial anthracosis.

Conclusions: There was a significant correlation between age of patients, pulmonary tuberculosis and bronchial anthracosis, therefore, performing necessary tests and follow-ups for pulmonary tuberculosis is necessary in cases that undergo bronchoscopy for any reason and those with bronchial anthracosis.

Keywords: Bronchial anthracosis, Bronchoscopy, Pulmonary tuberculosis

INTRODUCTION

Bronchial anthracosis is caused by the particles such as carbon, silica, quartz, etc. in the mucosa, under the mucosa and inside the macrophage which is seen in bronchoscopy as a black lesions. Anthracose pigments are predominantly found in the apex of the upper lobe, anterior margin, posterior of the upper and lower lobes of the lung.¹ Anthrax reduces the clearance of ciliary mucosa by damaging the bronchial mucosa, which can lead to infections such as pulmonary tuberculosis.² So far, no effective treatment has been reported for this disease.³

Anthracosis is an old disease commonly seen in older women who have a long history of to smoke and charcoal used for cooking and home heating.⁴ Occupational exposure to carbon, silica and quartz particles and smoke and dust from air pollution are currently known to cause lung anthracosis.⁵ Although the small amounts of carbon deposits in the lungs may not be pathogenic but residents of big cities may experience more severe pulmonary changes such as fibrosis, impaired elasticity and impaired lung capacity due to exposure to larger amounts of carbon deposition.⁶ The amount of carbon deposition in the lungs of different people depends on factors such as age, occupation, place of residence and previous lung

background.⁷ Anthracosis studies show a range of lung diseases, from asymptomatic simple mucosal anthracosis to severe fibrotic lung disease, with moderate to severe pulmonary ventilation disorders including obstructive, restrictive and mixed disorders.⁸ Studies on anthracosis from one hundred years ago until now, when the prevalence of pulmonary tuberculosis in the community, especially among coal miners has been high, indicating the strong proximity and clinical association of anthracosis and fibrosis with pulmonary tuberculosis.⁹ In studies, the association between pulmonary tuberculosis and anthracosis has been reported to be about 27% to 31%.¹⁰ In Iran the prevalence of anthracosis was identified, especially among coal miners and women who cooked in the traditional way and recently, several cases of anthracosis have been reported in different provinces of Iran even in people who have not had an occupational exposure to carbon. Studies have shown that, the prevalence of pulmonary anthracosis in Iran is between 8.5% to 10.7%.^{11,12} Tuberculosis is one of the oldest diseases and at the same time one of the health problems of the current century. The prevalence of the disease has so far been estimated at more than eight million, with an annual mortality rate of three million.¹³ Due to the fact that early diagnosis of tuberculosis is of great health and economic importance therefore it is important to identify the risk factors that are associated with this disease. Obviously, the diagnosis of anthracosis and suspicion of pulmonary tuberculosis can lead to timely diagnosis and treatment of this disease and be an effective help in solving the health problems of the community and sometimes eliminate the need for invasive surgical procedures especially in the elderly. Therefore, the aim of this study was to determine the frequency of bronchial anthracosis and its effective factors in referred patients to bronchoscopy in Ardabil city Hospital.

METHODS

Study design and patients

The present study was a descriptive cross-sectional study that was performed on 900 patients who underwent fiber optic bronchoscopy in Ardabil city Hospital during the three years of 2013-2015 due to pulmonary problems. All samples with confirmed bronchial anthracosis were entered in the study and the sampling method was census.

Data collection

Data were collected through a questionnaire containing demographic and clinical characteristics of patients. The diagnosis of anthracosis just was based on bronchoscopic findings. Patients who had narrowing or deformity in the lobular or segmental airways during bronchoscopy with the deposition of black pigments similar to tattooed spots were included in the study. Sputum samples were sent to the laboratory to test for the presence of tubercle bacilli and culture smears and lesion is observed in the bronchus, in addition to anthracosis a sample was taken from the

lesion and sent to a pathology laboratory for histological examination.

Inclusion and exclusion criteria

All patients with complete registered data on bronchial anthracosis were entered in the study and other patients with non-complete data were excluded from the study.

Statistical analysis

Collected data were analyzed by statistical methods in SPSS version 20 and p value less than 0.05 was considered significant.

Ethical approval

This study financially supported by Ardabil University of Medical Sciences and Approved by ethical committee of Ardabil Medical University.

RESULTS

Of the 900 patients who underwent bronchoscopy 42 (4.6%) had bronchial anthracosis of which 54.8% were male and the rest were female. The minimum age of patients was 41 and the maximum age 87 and 33.3% of patients were over 70 years and relationship between age and disease was statistically significant so that the incidence of anthracosis increased with age. The average age of all men was 60.19±15.47 and women 61.32±13.47 and average age of patients with anthracosis was 62.15±11.17 in men and 61.19±12.33 in women. 59.5% of patients were resident in the city which was statistically significant and 40.5% of patients were smokers of which 76.5% were male and the rest were female (Table 1). The results showed 31% of patients were workers and 26.2% were farmers of which 63.6% used fossil fuels for heating and anthracosis was observed among 42% of housewives of which 62.5% had a history of baking bread in the traditional way (Figure 1). Among patients with anthracosis, 21.2% were smear or BAL positive for TB of which 55.5% were male and the rest were female. There was no significant difference between patients with tuberculosis and gender.

Table 1: Demographic variables in studied patients.

Variables	N	%	
Age groups in years	40-50	5	11.9
	50-60	10	23.8
	60-70	13	31
	>70	14	33.3
Sex	Female	19	45.2
	Male	23	54.8
History of smoking	Present	17	40.5
	Absent	25	59.5
Residence place	Urban	25	59.5
	Rural	17	40.5

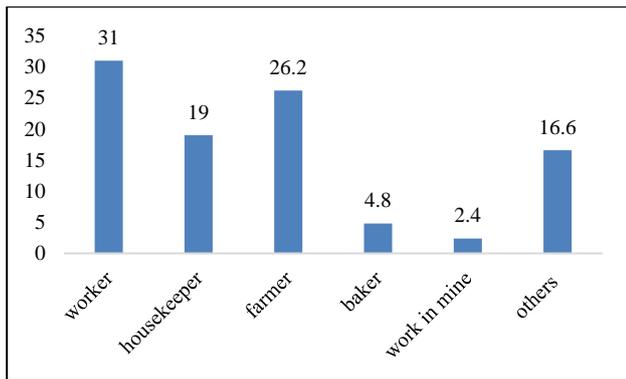


Figure 1: Frequency of job in all patients.

DISCUSSION

The results of this study showed that out of 900 bronchoscopic patients, 42 (4.6%) had anthracosis. In the study of Rezaeitalab et al, 22.5% of 1000 people had anthracosis.¹⁴ Study by Aslani et al showed that 10.4% of the 919 patients underwent bronchoscopy had anthracosis.¹⁵ The results of this study show that the rate of anthracosis in Ardabil was lower than other studies in Iran, which is probably due to the lack of mines in this province less air pollution and less traditional bread cooking due to industrialization of bread baking in most parts of the province. In the present study, most patients in the age group above 70 with 33.3% and the average age of the patients in the present study was 60.84 ± 15.24 years which was somewhat consistent with the results of other studies in Iran.¹⁴⁻¹⁷ The results of this study showed that, the incidence was higher in men than women and in urban residents more than rural. In the present study, 54.8% of the patients were male and the rest were female and in other studies, the prevalence was higher in men than women.^{15,16} But contrary to the results of the present study, in the studies by Rezaeitalab and Razy et al, the prevalence of the disease was higher in women than men.^{14,17} In the present study, 59.5% of the samples were from urban and the rest were from rural and the difference was significant. In the study of Amoli and Rezaeitalab et al, anthracosis was not significantly different between rural and urban residents, which was inconsistent with the results of the present study.¹⁴ More studies show that the prevalence of anthracosis in patients with high-risk occupations such as mining, kiln and cement workers, cement workers and bakers who bake bread in the traditional way is significantly higher than other occupational groups. In the present study, most of the patients were workers with 31% and farmers with 26.2%.^{1,14,18} Histological and anatomical changes of the lung in patients with pneumococcus, including anthracosis, silicosis and asbestosis have been introduced as an effective factor in the development of diseases such as tuberculosis, lung cancer and cor pulmonale.¹⁹ Hunter et al's study also noted the importance of the association between pulmonary tuberculosis and bronchial anthracosis caused by wood burning.²⁰ In this study, bronchial anthracosis was observed in 21.2% of cases

with pulmonary tuberculosis of which 45.5% had a history of baking bread in the traditional way. It seems that the method of preparing bread causes anthracosis bronchitis. In Aslani et al's study, 96 patients were selected from 919 bronchoscopy cases of which 26 (27%) had pulmonary tuberculosis, which was higher than the present study.¹⁵ Also, in the study conducted in South Korea there were 28 patients diagnosed with anthracosis that 17 of whom (61%) had active pulmonary tuberculosis.²¹ In the study of Tohidi, Razy, Aslani, Rezaeitalab et al, the diagnosis of active tuberculosis were observed in 30.2%, 25.4%, 27% and 22.5% of patients respectively which all of them were higher than the present study.¹⁴⁻¹⁷ Also, in a study in Korea, this rate was reported to be 61%, which was more than our study and was significantly different from other studies conducted in the country.^{14,17,18} In a study among African women, manually grind corn with stones and making dough was associated with bronchial anthracosis.²² Also in a study in Iran, a relationship was observed between baking bread by traditional methods and occurrence of bronchial anthracosis.⁹

CONCLUSION

The results of this study showed that the incidence of anthracosis in Ardabil is lower than other studies in Iran, which is probably due to the lack of mines in this province, less air pollution and less bread cooking in the traditional way due to industrialization of bread baking in most parts of the province. Also, due to the simultaneous occurrence of bronchial anthracosis and pulmonary tuberculosis in the present study and similar studies the presence of bronchial anthracosis, especially in the elderly with general and pulmonary symptoms can be one of the strong signs of pulmonary tuberculosis. Therefore doing necessary tests for follow-up and treatment of patients with pulmonary tuberculosis is essential.

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Conflict of interest: None declared

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