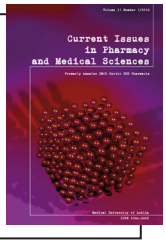
DOI: 10.1515/cipms-2018-0028 Curr. Issues Pharm. Med. Sci., Vol. 31, No. x, Pages 144-147

Current Issues in Pharmacy and Medical Sciences
Formerly ANNALES UNIVERSITATIS MARIAE CURIE-SKLODOWSKA, SECTIO DDD, PHARMACIA

journal homepage: http://www.curipms.umlub.pl/



The frequency of risk factors for pulmonary tuberculosis in tuberculosis patients in Babol, Northern Iran, during 2008-2015

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ARTICLE INFO

Received 15 February 2018
Accepted 10 May 2018

Keywords:
pulmonary tuberculosis, epidemiology, tuberculosis risk factors, Iran.

ABSTRACT

In the current study, we investigated the risk factors for tuberculosis in patients admitted to the Ayatollah Rouhani Hospital in Babol, north of Iran. This cross-sectional study was conducted on 207 patients with proven tuberculosis during the years 2008-2015. Demographic data such as age and sex, smoking, history of underlying illness, illness symptoms, and laboratory results were collected and analyzed at a significant level of less than 0.05. From 207 patients, 136 were male (65.7%), 71 were female (34.3%), and 76 of them (37.3%) were smokers. It is notable that most patients (29.5%) were over the age of 71. The relation between age profile and being tuberculosis has been studied, but the co-relation was found to be not significant. The most common complaint has been coughing (60.9%).

While investigating underling diseases, the most common illness has found to be Diabetes (11.3%). Based our finding, there was a significant relationship between gender and smoking with tuberculosis. Accordingly, as smoking is one of the risk factors for tuberculosis, smokers and non-smokers should be informed that smoking carries the risk for tuberculosis. Such a program should be particularly addressed to males.

INTRODUCTION

Tuberculosis, one of the oldest known diseases, is caused by Mycobacterium tuberculosis, and it appears in both pulmonary and extra-pulmonary forms [1,2]. Tuberculosis is also one of the most important diseases worldwide, and the World Health Organization (WHO) has declared it as an urgent international concern to alert the importance of tuberculosis epidemic and the risk of it becoming an incurable disease [3]. Each year, more than 9 million new cases occur and about two million people per year die world--wide from tuberculosis [4]. In Iran, the prevalence of TB is 20 cases per one hundred thousand people.

In most cases, the disease initially engages the lungs, but in 30% of all cases, other organs of the body are also infected by this germ. This form of affliction is called extra-pulmonary tuberculosis. The organs that can be infected by tuberculosis include the kidneys, heart, the digestive system, brain, bones, joints and larynx [5,6]. The most important infection route is through inhalation of the air contaminated with bacteria [7]. The most common clinical symptoms of this disease include fever and chills, anorexia, weight loss, and night sweats [8,9]. In this disease, localized symptoms at the site of the infection indicate the progression of the infection, and hemoptysis is one of the most seen symptoms of pulmonary tuberculosis [10].

Several risk factors have been mentioned for this disease, including smoking. This habit can increase the mortality rate in infected people and weaken the cellular and humoral immune system by disrupting the performance of the immune respiratory system and reducing the number of the lymphocytes [11]. Furthermore, the combination of HIV and tuberculosis is one of the main causes of mortality and morbidity in infected people in developing countries; the mortality rate in these people is two times more than those who do not suffer from both infections [12,13].

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Diabetes is also considered as a predisposing factor in the onset of tuberculosis infection.

Considering the occurrence of drug resistance, the failure to control tuberculosis and the high prevalence of tuberculosis in Iran (particularly in the northern area), the present study was designed in Babol, northern Iran, to investigate the frequency of risk factors for this infection in tuberculosis patients.

MATERIALS AND METHODS

This cross-sectional retrospective study was conducted descriptively among patients with pulmonary tuberculosis in Ayatollah Rouhani Hospital in Babol from 2008 to 2015. A total of 207 patients with pulmonary tuberculosis were included and were examined regarding the risk factors for tuberculosis. All patients were over 18 years of age and had the positive smear sputum test result and proven radiological changes indicating pulmonary tuberculosis. In cases where the mentioned criteria were incomplete, the patient was excluded from the study.

Ayatollah Rouhani Hospital in Babol is a specialized infectious disease center, and every year, a large number of patients with pulmonary tuberculosis from around Babol and the covered areas, as well as from other parts of Mazandaran province is referred to this center. Thus, this is a suitable center for conducting research in this regard. The patient data were extracted from the hospital's archive and documentation center while preserving the names and observing patients' rights. These include: demographic information of patients (age, gender, place of residence, marital status, occupation, history of imprisonment, smoking), history of underlying disease (diabetes, hypertension, cardiovascular disease, thyroid dysfunction, HIV), history of tuberculosis in family members, early symptoms (cough, weight loss, anorexia, night sweats, fever and chills, hemoptysis, asthma, chest pain) and laboratory information (level of white blood cells, liver enzymes, and serum electrolytes).

One of the problems expected in this study was the incomplete files or lack of information or the lack of records. Fortunately, the information was extracted properly and the flawed or unreliable files were excluded. The collected data were analyzed by SPSS v.16 software and were qualitatively shown as frequency and frequency percentage. Chi-Square test was also used to compare qualitative data. In all tests, the significance level was considered lower than 0.05. Several studies conducted in Iran confirm the results of the present study, while the results of some studies are not consistent with the results of this study [14,15].

RESULTS

Of the 207 patients in this study, 136 (65.7%) were male, and 71 (34.3%) were female, and the number of men suffering from this disease was significantly more than women ($P < 0.001$). Moreover, 76 patients (37.3%) were smokers ($P < 0.001$), indicating a significant difference compared to non-smokers. Other demographic information and patient records are shown in Table 1. In Figure 1, the age range of patients was analyzed based on gender. Accordingly,

Table 1. Distribution of demographic characteristics and records in patients with pulmonary tuberculosis (n=207) in Ayatollah Rouhani Hospital in Babolduring 2008-2015

Variables		Frequency (%)	P-value
Gender	Male	136 (65.7%)	0.001>
	Female	71 (34.3%)	
Place of residence	City	104 (50.2%)	0.05<
	Village	103 (49.8%)	
Marital status	Single	18 (8.7%)	0.05<
	Married	189 (91.3%)	
Occupation	Housewife	63 (30.4%)	0.05<
	Farmer	23 (11.1%)	
	Unemployed	9 (4.3%)	
	Other	54 (26%)	
	Not specified	58 (28%)	
Family history	Yes	20 (9.8%)	0.05<
	No	185 (90.2%)	
History of imprisonment	Yes	11 (5.3%)	0.05<
	No	195 (94.7%)	
Smoking	Yes	76 (37.3%)	0.001>
	No	128 (62.7%)	

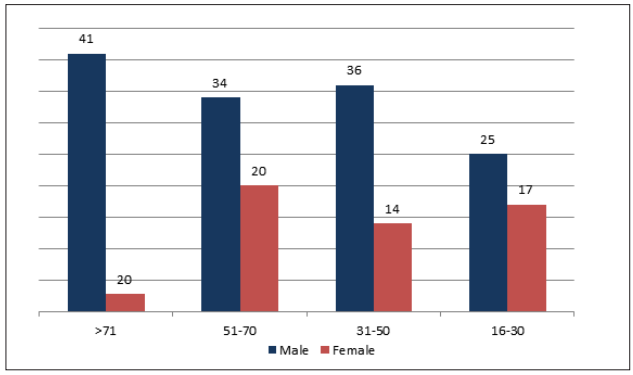


Figure 1. Age distribution in patients with pulmonary tuberculosis (n=207) in Ayatollah Rouhani Hospital in Babol during 2008-2015 based on gender ($p>0.05$)

41 (30.15%) male patients and 20 (28.17%) female patients were over the age of 71, constituting the highest percentage of their gender group. Also, 25 (18.38%) male patients were under the age of 30, constituting the lowest percentage of their gender group. Among women, 14 patients (19.72%) were 31-50 years old and constituted the lowest percentage of their gender group. Based on the analysis, there was no significant difference between age groups based on gender ($P = 0.608$). As shown in Figure 2, the most common clinical symptom in patients were cough (126 patients, 60.9%), followed by weight loss and anorexia (107 patients, 50.2%). Chest pain (6 patients, 2.9%) had the lowest prevalence among patients with tuberculosis. The most common underlying disease in patients with pulmonary tuberculosis in this center was type II diabetes (22 patients, 11.3%). After this, thyroid gland disorders (17 patients, 8.7%) was highly prevalent. HIV (4 patients, 1.9%) had the lowest prevalence in tuberculosis patients in this center (Figure 3). The laboratory data of

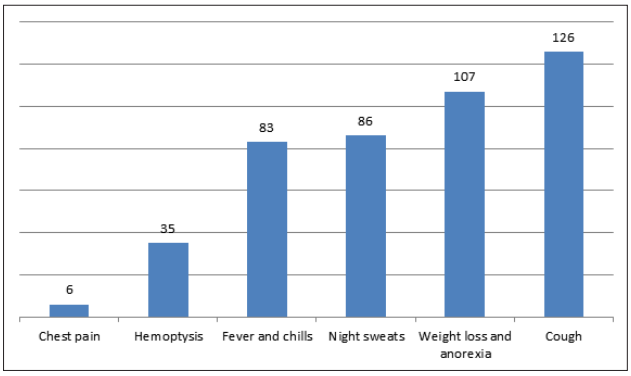
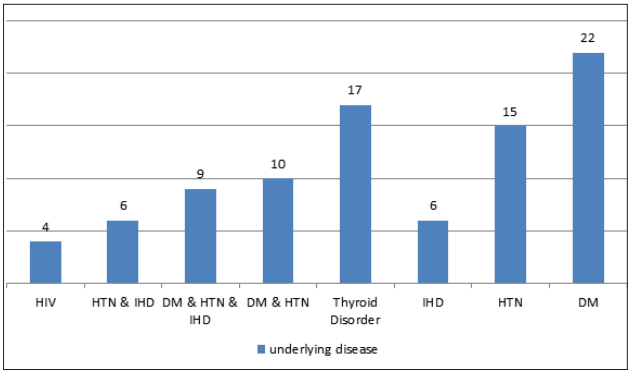


Figure 2. Distribution of disease symptoms in patients with pulmonary tuberculosis (n=207) in Ayatollah Rouhani Hospital in Babol during 2008-2015



Type II diabetes: DM, Hypertension: HTN, Cardiovascular disease: IHD

Figure 3. Distribution of underlying disease in patients with pulmonary tuberculosis (n=207) in Ayatollah Rouhani Hospital in Babol during 2008-2015

Table 2. Frequency distribution and frequency percentage of laboratory datain patients with pulmonary tuberculosis (n=207) in Ayatollah Rouhani Hospital in Babol during 2008-2015

Variable		Frequency (%)
White blood cells (WBC)	4000>	12 (5.8)
	4000-10000	120 (57.9)
	10000<	75 (36.3)
Liver enzyme based on gender	Male (ALT >40)	20 (9.6)
	Female (ALT >35)	18 (8.6)
AST	35<	52 (28)
ALP	300<	55 (29.9)
Na	130>	105 (51)
K	5<	55 (26.3)

patients in this study can be observed in Table 2. Herein, 87 patients (39.8%) had abnormal white blood cells; 38 male and female patients (18.2%) had abnormal ALT, 52 patients (28%) had abnormal AST, and 55 patients (29.9%) had abnormal alkaline phosphatase. One hundred and sixty patients (77.3%) showed electrolyte disorders in their laboratory results.

DISCUSSION

In this study that was conducted among 207 patients with pulmonary tuberculosis in Ayatollah Rouhani Hospital in Babol during 2008-2015, most patients were males, which showed a statistically significant difference compared to female patients. A high percentage of patients were smokers, which can be a major risk factor for tuberculosis. A high percentage of pulmonary tuberculosis patients were over 70 years old, and most in this category were male. Therefore, over 70 years of age and male gender can be major risk factors for pulmonary tuberculosis. Cough and weight loss are among the common symptoms in the studies population. Chest pain had the lowest incidence among pulmonary tuberculosis patients. The most common underlying diseases in the studied patients were type II diabetes and then thyroid disorders.

Regarding gender disparity, according to a report published by the World Health Organization in 2013, the male to female ratio of tuberculosis in Iran was 1:1 [16]. In a study in northern Iran, the male to female ratio of tuberculosis was 2:1, about half of the patients were rural and a high percentage of them were smokers. In another study in the capital of Iran, the male to female ratio of tuberculosis was almost 1:1 [15]. This study agrees with research done in Khuzestan province, wherein the prevalence of tuberculosis in the two sexes was almost the same [17]. In contrast, in an investigation in Jahrom, the incidence of tuberculosis in men was two times more than women. In this work, tuberculosis was also more common in people younger than 40 years [18]. However, in a study in Hamedan during 2007-2013, the sex ratio of tuberculosis was almost identical. Moreover, the urban population was two times more likely to be infected. In addition, here, patients over the age of 70 had higher rates of tuberculosis [19]. In contrast, in a study in Babol, during 2009-2013). the ratio of urban and rural patients was almost identical, however, men suffered from tuberculosis 1.5 times more than women. In this study, only three patients had HIV [20]. In another study in Tehran, while the ratio of men and women was similar, in this study, the proportion of urban patients was four times more than rural patients [21].

In our study, the ratio of tuberculosis in men was almost twice as high as women, the proportion of urban and rural patients were almost identical and most patients were smokers. Also, patients over the age of 70 had higher rates of tuberculosis [22].

In another study in Italy, it was suggested that the elderly are most at risk in the community and that the possibility of activation of latent tuberculosis infection is higher among the elderly due to underlying and immunological factors which are caused by old age. The study also investigated the role of alcohol consumption in increasing the risk of tuberculosis in the Italian population [23]. This study was consistent with the present study; according to the present study, old age was one of the predisposing factors for tuberculosis. In a study in Uganda, HIV infection, alcohol consumption, poverty, smoking, family history of tuberculosis, contact with the infected person and diabetes were identified as risk factors for tuberculosis [24]. Based on the present study, diabetes and smoking are among the most prevalent causes of tuberculosis, which is consistent with the result of the study in Uganda.

According to another study in 22 islands in the Pacific Ocean, the prevalence of tuberculosis and its mortality rate decreased dramatically. HIV was directly related to the prevalence of tuberculosis and most of these islands have a very low prevalence [25]. Only four people had HIV in the present study and thus, the risk level of this factor could not be analyzed. Therefore, further studies are required to evaluate this factor in people with HIV. One of the limitations of this study was the lack of a control group to compare the findings between patients and determine the risk factors for pulmonary tuberculosis infection.

CONCLUSION

Male gender and smoking are among the most important causes of tuberculosis. Given that smoking is one of the risk factors for this disease, it is possible to provide to initiate a program to prevent tuberculosis in which smokers would be informed that their habit is a major risk factor for contracting tuberculosis, while non-smokers are informed of the risk of taking up the habit. As being male is a risk factor, such a program should targeted towards the male gender.

ACKNOWLEDGMENTS

All of authors gratefully thank to department of infectious diseases of Babol University of Medical sciences, Iran. Moreover, the current project sponsored by Infectious Diseases and Tropical Medicine Research Center, Babol University of Medical Sciences, Iran (Project number: 3005).

CONFLICT OF INTERESTS

The authors declare that these is no conflict of interests.

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