

## Epidemiological patterns of Tuberculosis disease in the Babol, Iran

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### Abstract

**Introduction:** Almost one-third of the world's population is at risk of exposure to tuberculosis (TB) infection. The aim of this study is to describe some patterns of TB in the Babol, Iran, to analyze the current situation and to improve the care of these patients.

**Methods:** This was a cross-sectional study. The data were obtained from medical records pertained to patients with TB of Health Network of Babol County. The variables of interest were demographic characteristics and some clinical patterns. To describe data, indices such as mean  $\pm$  SD and frequency (percent) was used. Furthermore, analysis of the data was performed by inferential statistical techniques of chi-square, independent samples t-test, and one-way analysis of variance test.

**Results:** Two hundred patients with TB were enrolled. The average age of cases were 47.51 years [standard deviation (SD) = 21.36] and 58.5% of them were males. Age groups of 18-40 and over 60 years old comprised the majority of patients with TB 39.0 and 31.5%, respectively. The median interval time between beginning symptoms and confirmed diagnosis of TB was 56.5 days with interquartile range (IQR) of 56 days. The greatest of the time interval of beginning symptoms and diagnosis belonged to the age group of below 7 years old. The greatest time interval from confirmed diagnosis to treatment pertained to the age groups of 18-40 and 7-18, respectively. In terms of pulmonary TB, 120 (80.0%) were smear positive and 30 (20.0) smear negative. In terms of medicines given to the patients with TB, 181 (90.5%) were completed the treatment and improved, 6 (3.0%) absence of treatment, and 13 (6.5%) died as a result of TB and other causes.

**Conclusion:** This study showed that adults and elderly comprise the highest proportion of TB. The primary prevention and control programs for education and timely referral to the Health Network may be effective in diminishing the morbidity due to TB.

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### Introduction

The mycobacterium tuberculosis complex (MTBC) comprises nine bacterial species that causes tuberculosis (TB) in mammals such as

human beings.<sup>1</sup> Almost one-third of the world's population is infected with TB infection and/or at the risk of TB infection. About 9 million subjects with active TB and

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nearly one million people die of this disease annually.<sup>2</sup> More than 90% of cases and deaths due to TB occur in low and middle income countries, of which, 75% belong to the age groups of 15-54 years old resulting in a substantial losses in cattle herds and humans.<sup>3</sup>

The incidence and prevalence rates of TB in 2012 were 122 and 169/100000 people, respectively. It is estimated that only 67% of TB cases have been reported in the year 2012. For example, South Africa is a country with the highest incidence of TB in the worldwide, there were 550 cases/100000 population in 2003, 718 case/100000 population in 2004.<sup>4,5</sup> Incidence rate and prevalence rate of TB disease in Iran were seen in Sistan and Baluchestan, Khorasan, Mazandaran, Gilan, West Azerbaijan, East Azerbaijan, Ardabil, Kurdistan, Khuzestan provinces, and south beach to be high while the rates were low in the central parts of Iran.<sup>6</sup>

TB infection is one of the major public health problems and the most commonly opportunistic diagnosed infection among people living with human immunodeficiency virus (HIV) infection.<sup>7,8</sup> Delayed diagnosis of TB contributes to increased death rate among people infected to the HIV.<sup>9</sup> HIV is the most common risk factor for TB, and simultaneous infection with HIV is the leading cause of morbidity and mortality in patients with HIV/AIDS (acquired immune deficiency syndrome).<sup>10,11</sup>

According to the policy of the Ministry of Health of Islamic Republic of Iran, by the year 2025, the objective is increasing the detection rate of pulmonary TB of smear positive to more than 85% and the treatment rate of them to more than 90%.<sup>12</sup> Considering the role of epidemiology on clarifying current situation, providing detailed evidence on such diseases, and then making practical suggestions, this study was conducted to describe some epidemiological patterns of TB in Babol, Iran, over a 5 years period for better surveillance and recognition of groups at risk of exposure with TB infection.

## Methods

A cross-sectional study was conducted in the

health center of Babol County during the years 2009-2013. Babol County is located in Mazandaran province to the North of Iran with wet and rainy weather surrounded with the Caspian Sea.

Information in this study was extracted from medical records of patients with TB infection. The medical records of patients with TB are completed by the educated and trained staff in the health center of Babol County. The study population included all patients with confirmed detection of MTB infection. The investigated variables in this study were: Demographic characteristics of patients: age, gender, educational levels, job, marital status, place of residence, weight, and nationality; Some clinical patterns: years of TB detection, history of opium consumption and prison, time interval from beginning of symptoms to confirmed detection, time interval from confirmed detection to treatment, final status of antiretroviral therapy services given to the patients, site of involving TB in the body, and epidemiological definition of TB cases.

The sampling method was a census of all medical records which were registered in the health center of Babol County during the study course. Both descriptive and analytical statistics were used. Descriptive statistics: This part was reported with descriptive indices for continuous variables such as mean [ $\pm$  standard deviation (SD)] or median and interquartile range (IQR) according to distribution of data, and for uncountable variables frequency (percent) was reported. Furthermore, we categorized age into five age groups: below 7 years, 7-18, 18-40, 40-60, and beyond 60. Analytical statistics: One-way analysis of variance was used to test the difference between variable categories with the assumption of equal variance. A  $P < 0.050$  was considered as criterion significant level. The data were analyzed by SPSS software (version 19, SPSS Inc., Chicago, IL, USA).

The study protocol was reviewed and approved by the Institutional Review Board, which is the Ethics Committee of Babol University of Medical Sciences.

## Results

A total of 200 patients with TB disease were enrolled. The average age of patients with TB was 47.51 years ( $SD = 21.36$ ), and they were 1-91 years old. Furthermore, the average age of males and females was 50.04 ( $SD = 20.42$ ) and 43.93 ( $SD = 22.25$ ) years, respectively. The difference between the two groups was significant, in terms of age ( $P = 0.040$ ).

The average weight of patients with TB was 58.21 ( $SD = 15.61$ ), and patients' weight ranged from 4 to 110 kg. Also, the average weight of males and females was 60.92 ( $SD = 13.93$ ) and 54.39 ( $SD = 17.08$ ) kg, respectively. Regarding the average weight, there was a significant difference between two groups ( $P = 0.003$ ).

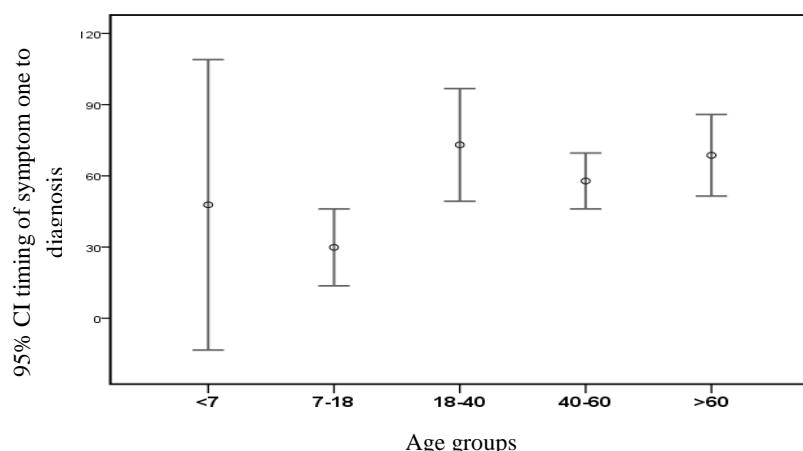
Totally, 177 (58.5%) of patients were male and in terms of nationality 197 (98.5%) of patients were Iranian. Age group 18-40 with 78 cases (39.0%) and age group over 60 with 63 cases (31.5%) comprised the majority of patients with TB and lowest proportion of patients with TB belonged to the age groups below 7 with 5 cases (2.5%) and 7-18 with 7 cases (3.5%).

The median of the time interval from beginning of symptoms to the confirmed detection of TB cases was 56.5 days with IQR of 56 days. Figure 1 demonstrates time intervals from the beginning of symptoms to the confirmed detection among different age groups. The age group below 7 years had the

longest time lag between the beginning of symptoms and confirmed detection. The time intervals of the age groups 18-40 and 7-18 from the confirmed detection to the treatment were the highest. The lowest time interval pertained to the age group of below 7.

In terms of epidemiological definitions of TB according to received services of antiretroviral therapy, the cases divided into the following groups: new cases: patients not received antiretroviral therapy or history of antiretroviral therapy is shorter than 4 weeks 190 cases (95%); recurrent: patients who referred with positive phlegm smear while they were supposed to be improved or get the complete treatment in the past due to the infection of any forms of TB 6 cases (3%); absence of treatment: positive smear patients received at least 1 month of antiretroviral therapy or maximally 2 months after 2 cases (1%); Others 2 cases (1%).

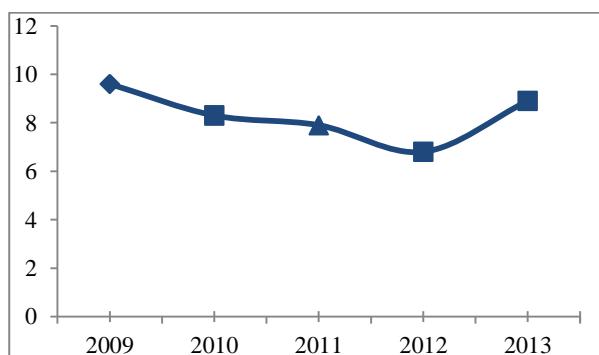
In terms of medicines given to the patients with TB, 181 cases (90.5%) belonged to the category of improved and completed treatment, 6 cases (3.0%) to absence of treatment, and 13 cases (6.5%) died as a result of TB and other causes. There was a statistically significant difference between age groups and the final outcome of treatment ( $P = 0.001$ ). There was also a statistically significant difference between a job and the final outcome of treatment ( $P = 0.002$ ).



**Figure 1.** Comparison of the time interval of beginning of symptoms to confirmed detection between age groups of patients with TB (tuberculosis) referred to the health center  
CI: Confidence intervals

Residency area of 103 patients (51.5%) was urban. In term of education level, 65 cases (32.5%) were illiterate, 40 cases (20.0%) were elementary and 41 cases (20.5%) were guidance school. Totally, 160 cases (80.0%) were married. In terms of job, 58 patients (29.0%) were a housekeeper, 30 cases (15.0%) were a farmer, and 25 cases (12.5%) were others.

Among patients with lung TB, 120 cases (80.0%) were positive smear and 30 (20.0%) were a negative smear. Of extra-pulmonary TB site of involving of the body, 21 (42.0%) were pleura, 10 (20.0%) were lymph nodes, and 19 cases (38.0%) were other organs. Totally, 47 cases (23.5%) had a history of contact with patients with TB, 133 (66.5%) did not report any history of contact, and for 20 cases (10.0%) the history was indeterminate. The annual trend of TB per 100000 people in the Babol County is indicated in figure 2.



**Figure 2.** Trend of incidences of TB (tuberculosis) disease per 100000 population of Babol County

## Discussion

In our study, the incidence rate of TB disease during 2009-2013 years has been diminished from 9.6 cases to 8.9 cases. The age group 18-40 and over 60 years old comprised the majority of patients with TB. This finding is in line with previous studies in different provinces of Iran.<sup>13-16</sup> It seems that the high incidence of TB in the age group 18-40 is related to more exposure of them due to being in the open environment, especially men. In case of older patient, the TB incidence can be attributed to the weak immune system.

In our study, the majority of patients with TB were pulmonary TB (75% of all TB cases)

and the majority of them were positive smear (80.0%). Other studies in different areas of Iran also reported similar proportion of pulmonary and positive smear patients with TB.<sup>17-23</sup> This indicates that the proportion of these patients has remained almost fixed during last years.

The highest amount of time interval from beginning of symptoms to confirm diagnosis belonged to the age group < 7. Probably, due to a non-specific symptom of TB in this age group. The age groups 18-40 and 7-18 had the highest time interval of detection to treatment, and the lowest time interval from detection to treatment belonged to the age group < 7 years. It might be due to that families are more sensitive about the treatment of their children, especially the infants.

In our study, the majority of patients with TB infection pertained to the category of improved and category of completed antiretroviral therapy (90.0%). The World Health Organization (WHO) target is reaching to the curing rate of 85.0% in the patients with TB while this study shows that the target is reached and passed in this region. In a study, the success rate of treatment among pulmonary positive smear TB cases was 87.7%.<sup>17</sup> And in another study, the rate of positive response to the treatment of TB was reported to be 64.5%.<sup>24</sup> These findings in Iran imply that supportive programs and medicines provided to the patients with TB have improved.

## Conclusion

This study showed that adults and elderly comprise the highest proportion of TB. The primary prevention and control programs for education and timely referral to the Health Network may be effective in diminishing the morbidity due to TB.

## Conflict of Interests

Authors have no conflict of interest.

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