

Causes of Delay in Diagnosis of Smear-Positive Pulmonary Tuberculosis Patients Referred to the Tuberculosis Center of Zahedan

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| Article information | Abstract |
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| <p>Article history: Received: 14 Dec 2011 Accepted: 12 Jan 2012 Available online: 13 Feb 2012</p> | <p>Background: Tuberculosis is now the major cause of mortality in the world. This study has tried to identify the factors affecting the diagnosis of this disease by determining the relationship between delay in diagnosis and factors associated with patient and health system.</p> <p>Materials and Methods: This research was a cross-sectional study conducted on smear positive pulmonary tuberculosis patients referred to the tuberculosis center in the first half of 2008. Required information was completed through patient records and patient interviews.</p> <p>Results: A total 98 patients were studied including 42 males and 56 females. Average age of patients was 51.6 ± 19.57. Average delay in diagnosis was 2.8 ± 1.78 months. The average delay of patients and health system was respectively 2.6 ± 1.76 months and 6 ± 4.27 days. Data analysis showed that there is no relationship between the delay in diagnosis and individual variables such as age, gender, occupation, etc., and examination of sputum smears at the first visit. However, there is a significant relationship between patient delay with different factors such as education ($p=0.03$), marital status ($p=0.03$), existence of hospital or medical centers in the residence ($p=0.02$), distance to the medical center ($p=0.02$) and between health system delay and residence in the city ($p=0.01$), distance to this medical center ($p=0.03$) and obtaining chest X-ray (CXR) in the first visit ($p=0.003$).</p> <p>Conclusion: The results showed that with the increase of literacy, the establishment of new hospitals and health centers in remote areas and suburbs as well as chest X-ray in the first visit, the amount of delay in diagnosis can be reduced.</p> |
| <p>Keywords: Delay Diagnosis of pulmonary TB Smear-positive</p> | |
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Introduction

Tuberculosis is considered an important cause of mortality in the world and is one of the oldest diseases that affect humans. Given the widespread prevalence of TB infection, this disease is declared as a global emergency by WHO. Tuberculosis is caused by *Mycobacterium tuberculosis*. This disease usually affects the lungs; however, it affects the other organs in a third of cases. The most common points affected by extra-pulmonary tuberculosis include lymph nodes, pleura, gastrointestinal system, bones, joints and peritoneal [1, 2].

According to the estimation of World Health Organization, a third population in the world is affected with tuberculosis. 14.5 million people in the world are infected with tuberculosis, 80% of which are related to 22 developing countries in the world.

Annually, 9 million new TB cases are reported in the world. Approximately two million people lose their lives due to this disease. The results of studies in 2006 in different provinces of the country show that the incidence of sputum positive pulmonary tuberculosis in the entire country is 13 per hundred thousand. Also, in Sistan and Balouchestan province, the incidence of tuberculosis is

48.5, smear positive pulmonary TB 28.8 and smear negative pulmonary TB 9.4, extra-pulmonary TB 8.22 in 100,000 people, which is the highest smear-positive tuberculosis in the country, is related to this province [3].

The most important diagnostic techniques include chest radiography, sputum smear microscopic examination, mycobacterial culture, and PCR and PPD skin test [4].

Despite great advances, one of the main causes of mortality in our communities is pulmonary tuberculosis. Thus, timely diagnosis of this disease is highly important. One of the main causes of mortality and disability caused by pulmonary tuberculosis in developing countries is a delay in diagnosis [5]. According to the points mentioned above, high importance of the diagnosis is determined. Thus, this study has tried to identify the factors affecting the diagnosis of this disease by determining the relationship between delay in diagnosis and factors associated with patient and health system.

Materials and Methods

This research was a cross-sectional study conducted on smear positive pulmonary tuberculosis patients referred to

the tuberculosis center of Zahedan in the first half of 2008.

Information required to complete forms was collected through patient records, TB card and interviews with patients. In the early entry of all individuals to the project, informed consent was obtained from them.

The questions used in the form of patients were closed questions containing the information about age, gender, marital status, ethnicity, occupation, education level, residence, hospital or medical center at the residence, walking distance to the center (in minutes), date of symptom onset, date of the first visit, the location of the first visit, someone who has done the first visit, conducting chest X-ray and sputum smear at the first visit, date of diagnosis, symptoms at first visit, the number of visits from the referral to the diagnosis, history of pulmonary disease, addiction, history of contact with a person with tuberculosis and history of previous infection with tuberculosis.

A disease is considered smear-positive pulmonary tuberculosis that has at least two positive sputum smear tests or a sputum smear test and tuberculosis confirming radiographic changes or a sputum smear test in addition to a case of positive sputum culture. Also, concepts related to the delay were defined as follows:

Patient delay: time interval between onset of symptoms and first visit to the medical center. Health system delay: the time interval between the patient's referral to the medical centers and final diagnosis of TB. Diagnostic delay: It is a combination of patient delay and health system delay

Statistical *t*-test, Pearson correlation coefficient, One-way ANOVA and post-hoc Tukey test were used for data analysis. The statistical significance level of statistical results was considered $p < 0.05$.

Results

A total 98 patients were studied in this project, which included 42 men (42.8%) and 56 women (57.2%) respectively. Average age of patients was 51.6 ± 19.57 years (range 10-87 years).

The average diagnosis delay in this study was 2.8 ± 1.78 months, the average patients delay was 2.6 ± 1.76 months and the average delay of health system was 6 ± 4.27 days. Patient delay in all cases was more than health system delay.

Average number of visits from the first visit to diagnosis was 2 visits (ranging from 1 to 5 visits). 63 patients (64.5%) had been visited more than once before their diagnosis. Almost all patients who referred to a private clinic for the first visit were referred after one visit (90.9%).

About gender, patient delay and health system delays in females were slightly higher, but they were not significantly different. Regarding the variable of age, it was found that there is no relationship between age and delay in diagnosis. Also, to determine the relationship between the variable of marital status and delay in diagnosis, results showed that married patients have been

more delayed ($p=0.03$). But being married has no role in the health system delay.

the results of comparing average referral delay and health system delay in terms of literacy showed that means vary by literacy, people who had education of diploma and above had less time both in terms of patient delay ($p=0.03$) and average health system delay ($p=0.02$).

Regarding the variable of occupation, data analysis showed that this variable has no relationship with diagnostic delay. Diagnostic delay and drug addiction are not correlated.

Data survey showed that there is no relationship between pulmonary disease and diagnosis delay. There is a relationship between previous infection with TB and health system and patients delay ($p=0.03$) and patients referred with previous history of TB with less delay and less health system delay in this case ($p=0.03$).

In addition, data analysis showed that there is no significant relationship between history of contact with a TB patient and delay in diagnosis.

Table 1. Demographic characteristics of patients

| Variable | Male N(%) | Female N(%) | Total N(%) |
|--|-----------|-------------|------------|
| Number | 42(42.8%) | 56(57.2%) | 98(100%) |
| Mean age (year) | 49.1 | 54.1 | 56.1 |
| Married | 39(39.7%) | 53(54.1%) | 92(93.8%) |
| Illiterate | 12(12.2%) | 45(45.7%) | 57(57.8%) |
| Unemployed | 17(17.3%) | 56(57%) | 73 74.4%) |
| With lung disease | 10(9.8%) | 7 (7.3%) | 17(17.1%) |
| Addiction | 21(21.3%) | 12(12.3%) | 33 33.6%) |
| History of contact (with an infected person) | 14 14.2%) | 25 (25.5%) | 39 39.7%) |
| Previous history of TB | 9 (9.1%) | 6 (6.2%) | 15 39.7%) |
| Presence of health centers | 40(40.4%) | 51 (51.6%) | 91 (92%) |
| Performing sputum smear in first visit | 36(36.6%) | 42 (42.5%) | 78 79.5%) |
| Performing CXR in first visit | 40(40.4%) | 46 (47%) | 86 87.7%) |
| First visit by a doctor | 36(36.6%) | 55 (56.1%) | 91 92.8%) |
| Traditional physician in first visit | 3(3%) | 4(4.1%) | 7 (7.1%) |
| First admission to hospital | 27(27.5%) | 26(26.5%) | 53(54%) |
| First visit in private clinic | 6(6.1%) | 16(16.3%) | 22(22.4%) |
| First visit in private health center | 11(11.2%) | 10(10.2%) | 21(21.4%) |

Table 2. Relationship between demographic characteristics and average delay by day

| Variable | Health system delays | Patient delay |
|----------------|----------------------|---------------|
| Gender | male | 7.75 |
| | female | 8.1 |
| | <i>p</i> -Value | 0.59 |
| Marital Status | Married | 7.5 |
| | Single | 7.2 |
| | <i>p</i> -Value | 0.03 |
| Literacy | Illiterate | 84.6 |
| | Under of Diploma | 7.9 |
| | Above of Diploma | 3.6 |
| | <i>p</i> -Value | 0.03 |
| Employment | Employed | 6.3 |
| | Unemployed | 8.2 |
| | <i>p</i> -Value | 0.15 |
| Lodging | City | 7.0 |
| | Village | 13.2 |
| | <i>p</i> -Value | 0.30 |

Discussion

Results showed that there is no relationship between delay in diagnosis and age, gender, occupation, addiction of patients, concomitant pulmonary disease, and history of contact and sputum smear test at the first visit. On the other hand, higher education levels, being unmarried, previous history of tuberculosis, residing in the city, access to more health facilities, referral to private clinics and hospitals, physician visits and CXR in the first visit are of the factors that decrease the overall delay in diagnosis.

The study conducted by Malbasa et al. showed that patients' delay in the diagnosis is 44 ± 61 days and the overall delay is 103 ± 148 days. Factors such as alcoholism, absence of tuberculosis in the family, diabetes mellitus, and absence of hemoptysis, age above 40, sputum smear positive and lack of symptoms in pulmonary auscultation were significantly associated with patient delay. Factors such as age less than 40, female gender, no obvious symptoms of illness and residing in the city were associated with overall delay. In this study, factors of delay in the diagnosis were inconsistent with our study [6].

In the study of Machado in Brazil, the average interval between symptoms occurrence and final diagnosis was 68 and patients' delay was 30 days. There was a significant relationship between factors such as female gender, unemployment and cough with patients' delay and the only female factor associated with health system delay. But in our study, gender and unemployment had no relationship with a delay in diagnosis [7].

In the study conducted by Leutscher on 313 people, the overall delay was 123 days and patients delay was much more than health system delay. In this study, factors of female gender and non-Danish race are of factors affecting the overall delay in the diagnosis. These results were inconsistent with our study [8].

In another study conducted by Zerbini et al. on 243 patients with positive pulmonary TB, the overall average delay was 92.1 days in which patients' delay was 58 days and health system delay was 34.1 days. The most important risk factors that were associated with delay were living too far from health centers and over 50 years of age. This study, like our study, has regarded "living far from health centers" as a factor of delay in the diagnosis [9].

In the study conducted by Demissie et al. on 212 patients with smear-positive pulmonary tuberculosis, the overall average delay was 8 weeks in which average patients' delay was 3 weeks, and health system delay was 5 weeks and the most important risk factors in diagnostic delay included late referral, paying the first visit to the traditional healer, living in villages, absence of hospitals in the residence and being married [10].

In a similar study conducted by Rezaeetalab, the overall delay and the patient delay were reported 99 ± 44 and 14 ± 10 days, respectively. In this study, there was no relationship between age, gender, occupation, urban residence, nationality and education level, but educational

level and urban residence were of factors of diagnostic delay in our study [5].

In our study, all cases of patients' delay have been more than health system delay. However, in most studies mentioned before, we observe cases in which health system delay is more than patients' delay. On the other hand, in the reviews we conducted, there was a significant difference between the average patients' delay and health system delay (approximately 70-71 days). However, in most studies mentioned before, this difference is much less and it can be easily concluded that in our study, the main cause of increased delay in diagnosis is delay in the first visit of patients.

Finally, we conclude that factors such as illiteracy, being married, residing in the village, lack of access to hospitals and health centers, first visit by low knowledge people, referring to the non-specialist centers in the first visit and not performing chest X-ray at first visit are of factors involved in delayed diagnosis of tuberculosis.

One of the weaknesses of the project was its implementation only in Zahedan and on 98 patients with smear-positive TB patients. In this regard, it is hoped to conduct similar studies with more patients in all cities of the province.

Given the above results and the main purpose of this study which was to identify factors influencing delay in TB diagnosis and appropriate encounter with these factors for better control of TB, in this area it is recommended that public education of the community should be conducted through mass media, magazines and Newspapers regarding ways of transmission and prevention, and especially the main symptoms of the disease. New health centers should be established in rural and remote areas and countryside so that the access to them would be easy for everyone. More and more complete education about TB and its symptoms and diagnosis methods should be given to the health care operators. Chest X-ray should be performed in the first visit in suspected cases.

Sputum smear should be performed at the first visit in suspected cases and it should be repeated at adequate intervals and it should be noted that the negative result of this test does not negate the disease.

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Authors' Contributions

All authors had equal role in design, work, statistical analysis and manuscript writing.

Conflict of Interest

The authors declare no conflict of interest.

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