

Epidemiology of Tuberculosis in Ardabil Province, 2011-2016

Firouz Amani¹, Anahita Zakeri^{2*}, Mahin Sadeghnejad³, Vahid Abbasi⁴ and Jafar Mohammadshahi⁵

¹Department of Community Medicine, Faculty of Medicine, Ardabil University of Medical Science, Ardabil, Iran; firouz.amani@arums.ac.ir

²Department of Internal Medicine, Faculty of Medicine, Ardabil University of Medical Science, Ardabil, Iran; a.zakeri@arums.ac.ir

³Ardabil TB Register Center, Ardabil University of Medical Science, Ardabil, Iran; msadeg75@yahoo.com

⁴Department of Neurology, Faculty of Medicine, Ardabil University of Medical Science, Ardabil, Iran. v.abbasi@arums.ac.ir

⁵Department of Infection Disease, Faculty of Medicine, Ardabil University of Medical Science, Ardabil, Iran; j.mohammadshahi@arums.ac.ir

Abstract

Background: Tuberculosis (TB) is a chronic bacterial disease caused by mycobacterium tuberculosis that appears in 85% of cases by pulmonary form. Epidemiologic study of disease during the time can have important rule for evaluation strategy of diseases control and trend of health indices. **Purpose:** The aim of this study was to investigate the epidemiology of Tuberculosis in Ardabil province. **Method:** This descriptive cross-sectional retrospective study was conducted on 797 TB patients who referred to health centers in Ardabil province. Information was collected from patients' records and then analyzed by statistical methods in SPSS version 19. **Results:** The average age of patients was 44.3±18.1 (1-91 years). 46% of patients were male and the rest were female. 83% of patients were living in urban and 18% in rural areas. The mean of total incidence of TB in Ardabil province during study years was 10.26 per 100000. From all TB cases, 56.71% was pulmonary and rest was extra-pulmonary. The most common organs involved in extra-pulmonary TB were lymph nodes with 24.21%. **Conclusion:** More considering to the early known of Pulmonary Tb and starting treatment after confirmation and also considering to the lower age of TB cases, assessment the barriers to implementation of control, therapeutic and educational programs about TB cases is essential.

Keywords: Ardabil, Epidemiology, Incidence, Tuberculosis

1. Introduction

Tuberculosis (TB) is a common cause of death due to Single-agent infectious diseases in world and despite the advances in medical science; it remains a health problem in many countries. TB is occurring due to Mycobacterium Basil and usually enters to body during infancy. By over time and also due to weakening of the immune system, Bacilli were multiplying and cause recurrence of the disease. TB had the 10th rank in burden of diseases and it predicted that till 020 it reaches to 7th rank.

According to the report of WHO in year 2011 the total cases of TB was 14.8 million and yearly about 9.3 million suffer to TB and 18 million die due to TB.

According the report of Iran ministry health, yearly 14.4 cases per 100000 suffered to TB. The incidence of extra-pulmonary in Iran from 2011 with 4.16 per 100000 decreased and reaches to 3.2 per 100000 in 2016 (2555 cases). About one-third of people with AIDS are associated with tuberculosis and this rate in Mediterranean was 23%. The HIV infection increase the risk of TB activation more than 10 times and according to the WHO in year

*Author for correspondence

2011 about 13% of TB patients also had HIV. Tb could infect whole organs of the body, but the common form of TB is pulmonary that in adults, it is usually accompanied with smear positive sputum and highly contagious. TB appears in 85% of cases by pulmonary form and rest of them by extra-pulmonary form. Khazaei *et al.*, in a study on 440 TB patients with smear positive sputum found that the median time for negative result of smear sputum in patients was 3 months. In the end of second month, smear sputum in 69% of patients was negative and this rate reach to 88% in the end of third month¹.

One of the Millennium Development Goals (MDGs), was decreasing the rate of death due to TB in 2015 to half of 1990 death rate. Because of Iran's neighbors with Pakistan and Afghanistan countries and also due to the higher rate of TB in these countries, the risk of suffering to TB in our country is high and Iran had the 17th rank in the world².

Gupta *et al.*, in a study found that factors such as smoking, Alcohol consumption, liver and kidney diseases, mall-nutrition and history of TB in family are effective factors³.

Heshmati *et al.*, in a study showed that 74.7% of TB patients are in the form of pulmonary and most of extra-pulmonary cases were lymph nodes with 3.3%⁴.

Shaghafipour *et al.*, in a study during 2003-2010 found that 71.9% of pulmonary TB cases were positive smear and rest of the negative smear⁵.

In a study done by Hazrati *et al.*, in Ardabil in 2005-2010 results showed that the TB total incidence rate was 8.54 per 100000 in Ardabil city and 56.2% of patients have pulmonary TB and rest of them have extra-pulmonary TB⁶.

Salek *et al.*, in a study showed that the incidence of positive smear pulmonary TB decreased 4 times and also the rate of other TB cases decreased. Until age 10 year, there wasn't difference between two sexes but in age groups 10-14, the rate of incidence in girls was 2 times boys. Also, they found that this reduction can be related to improve the care system and health promotion⁷.

Beyramvand *et al.*, in a study in 2014 showed that the simultaneous incidence of HIV infection and tuberculosis in the southwest of Iran was high².

Study the epidemiology of TB during time and identify of disease trends and its changes in over time can be great importance in implications and achieve to using strategies for control disease, improve health and health

promotion. The aim of this study was to investigate the epidemiological situation of tuberculosis in Ardabil province during 2011-16.

2. Materials and Methods

This retrospective descriptive cross-sectional study has been done on all 797 TB patients that registered in Ardabil province from 2011 to 2016. The sampling method was census and all TB registered cases during study years entered the study and all TB cases confirmed by experimental tests by specialists. All patients with positive smear results entered the study and doubtful cases without TB excluded from the study. Personal Information and epidemiological data such as age, Sex, residence place, name of city and clinical data (Smear results, type of TB, and cause of extra-pulmonary TB) were collected by a checklist for all registered TB patients and then analyzed through SPSS.16 software by descriptive and analytical statistical methods. Also, we used the population statistics of each study years for estimation the incidence of TB in Ardabil province during the study years. The data extracted from the national TB registered data of Ardabil province which ethically approved by Ardabil University of Medical Science, Ardabil, Iran.

3. Results

Of all patients, 429 (54%) cases were male and rest of them was female. The mean age of patients was 44.3±18.1 in ranging 1 to 91 years. 662 (83%) of patients were living in urban and 17% in rural areas. (Table 1)

The most of Tb cases were seen in age group 35-65 years and the least of cases were in age group low than 10 years. The rate of incidence of TB during study years had swinging (Table 2).

During study years, 452 cases (56.7%) had pulmonary TB that of them 52.2% occurred among men and 63.1% among urban people. There wasn't significant relation between TB type and sex but the relation between type of TB and residence place was significant (Table 3).

Of all cases, 0.6% had HIV, 56.7% had pulmonary TB and of them 77.2% had positive smear results (Table 4).

2.3% of patients had a prison history. The mean of overall TB incidence rate was 9.3 per hundred thousand in the city of Ardabil during the study years (Table 1).

Table 1. Demographic characterized of patients by year

year	Residence place				Sex				Total number	Incidence rate per one hundred thousand
	Urban		Rural		f		m			
	n	%	n	%	n	%	n	%		
2011	89	64.1	50	35.9	78	56.1	43.8	43.8	139	10.9
2012	106	63	62	37	91	54.1	45.8	45.8	168	13.2
2013	88	61.1	56	38.9	65	45.1	54.8	54.8	144	11.2
2014	67	53.6	58	46.4	71	56.8	43.2	43.2	125	9.5
2015	81	66.9	40	33.1	71	58.6	41.3	41.3	121	9.1
2016	72	72	28	28	53	53	47	47	100	7.6
Total	503	63.1	294	36.9	429	53.8	46.1	46.1	797	62.5

Table 2. Frequency of TB cases by age groups

Years	<=10	10-35	35-65	>65	Total
2011	0	51	65	23	139
2012	4	58	73	33	168
2013	5	50	61	28	144
2014	3	41	61	20	125
2015	3	26	63	29	121
2016	1	30	57	12	100
Total	16	256	380	145	797

172 (56.2%) of patients have TB in pulmonary form and others in extra pulmonary. From the organs involved in extra-pulmonary tuberculosis, most of them related to the lymph nodes with 35 cases (26.1%) (Table 2).

According to the results, the total rate of TB in year 2012 with 13.2 per 100000 was the most (Table 5).

Of all extra-pulmonary TB cases, the most of TB cases related to lymph nodes Tuberculosis with 84 cases (24.2%) (Table 6).

Table 3. Frequency of TB cases by sex and residence place and type of TB

Type of TB	Residence place				Sex			
	Urban		Rural		Male		Female	
	n	%	n	%	n	%	n	%
Pulmonary TB	285	63.1	167	36.9	216	47.8	236	52.2
Extra-Pulmonary TB	197	57.1	148	42.8	213	61.7	132	38.3
Total	482	60.5	315	39.5	429	53.8	368	46.2

Table 4. Frequency of patients by years, smear results and type of TB

years	Positive smear		Negative smear		Total cases		Extra-pulmonary cases	
	n	%	n	%	n	%	n	%
2011	67	48.2	9	0.06	76	54.7	63	45.3
2012	89	53	22	13.1	111	66.1	57	33.9
2013	63	43.8	28	19.4	91	63.2	53	36.8
2014	56	44.8	13	10.4	69	55.2	56	44.8
2015	42	34.7	18	15	60	50	61	50.4
2016	32	32	13	13	45	45	55	55
Total	349	43.8	103	12.9	452	56.7	345	43.3

Table 5. TB indicators during years 2011-2016

Indicators	2011	2012	2013	2014	2015	2016
Incidence of smear-positive pulmonary tuberculosis	4.7	6.7	4.6	4.2	2.9	2.3
Incidence of smear-negative pulmonary tuberculosis	0.4	1.3	1.8	0.9	1.3	0.8
Incidence of extra- pulmonary tuberculosis	4.9	4.5	4.1	4.3	4.6	4.2
Total Incidence of tuberculosis	10.9	13.2	11.2	9.5	9.2	7.6
Proportion of smear-positive TB to pulmonary tuberculosis	67	89	63	59	42	32
smear-positive new cases	83	107	72	79	48	44
Rate of recovery in patients with smear-positive pulmonary tuberculosis	86.67	84.71	83.05	87.27	89.74	81.82
Rate of successful treatment in patients with smear-positive pulmonary tuberculosis	91.67	88.24	83.05	89.09	89.74	81.82

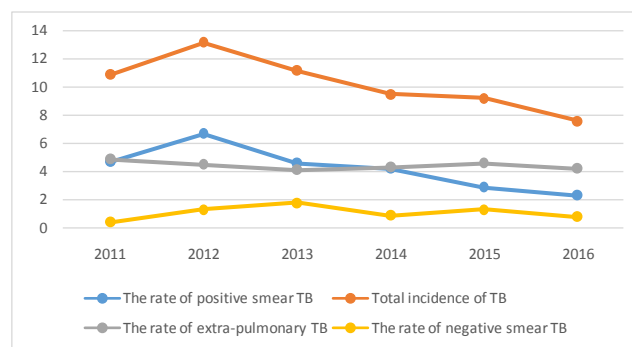
Table 6. Distribution of cases with extra-pulmonary tuberculosis

Extra pulmonary tuberculosis	Number	Percentage
lymph nodes Tuberculosis	84	24.21
Pleural	49	14.12
Bone Tuberculosis	59	17
Tuberculosis Urinary	19	5.48
Billion	8	2.31
Pericardial	4	1.15
Tuberculosis meningitis	7	2.02
Digestion	9	2.59
skin TB	11	3.17
Peritoneal lining	20	5.76
Genital	1	0.29
Eye	31	8.93
Other	23	6.63
Total	22	6

Results showed that the rate of smear positive and negative TB after 2012 had decreasing trend till end of study (Figure 1).

4. Discussion

During study years, in Ardabil Province the mean of incidence rate was low than 11 per 100000 even though fluctuations have been observed over these six years. In Ebrahimzadeh *et al.*, study the incidence rate of TB in Birjand had decreasing trend. Also, in Sofian study in

**Figure 1.** Changes trend of TB indices during study years.

Arak and Yazdani in Mazandaran there was decreasing trend. In Arsang study the total TB incidence rate had decreasing trend⁸⁻¹¹

The mean age of patients in this study was 44 which was in line with Beyramvand *et al.*, study in south-east of Iran with 39 year and Vosougi *et al.*, study in Hamadan with 54 year^{2,12}.

In this study most of cases were in age group up 65 years. The most cases in Ilam and Arsang studies was up 65 years, in Hamadan up 50 year and in some places were in range 40-70 years^{8,10-14}.

As the age of the immune system increases, as the age grows, the chance of becoming a tuberculosis infection increases with tuberculosis and also, we can consider the increasing age as a risk factor for TB suffering. In this study 39.5% of cases were in rural and 60.5% in urban areas which in other studies in Iran the urban rate changes from 51% to 64% which was in line with our study results¹⁴⁻¹⁶.

The results showed that of all cases, 56.7% had pulmonary TB and 43.3% had extra-pulmonary TB. Results showed that the type of TB in Ardabil province related

to the TB status in other places. The most of smear positive pulmonary TB cases is related to 2012 year, after 2012 year was declining that statistically no significant, it can be concluded that number of patients found have a constant trend. From all 797 patients, 43.8% in smear positive pulmonary TB, 12.9% in smear negative pulmonary TB and 61.7% in extra pulmonary TB cases were men that is similar to other studies^{7,12}. TB is the second leading cause of death from an infectious disease worldwide (after HIV which caused an estimated 1.8 million deaths in 2008). Tuberculosis is the largest cause of death from single factor infectious diseases in the world (more than Aids, Malaria and Measles). TB is in the tenth rank of burden diseases and predicted until 2020 maintain its current position and some time increase to seven ranks. Currently, the incidence of smear positive pulmonary TB is the main indicator to measure the situation of TB in the community is the number of people with smears positive pulmonary TB during a year per hundred thousand people. Doing screening tests for exposed people, applied new diagnosis and treatment methods must be included in TB control strategic programs. Also achieve to the smear positive case identification more than 85% and success in TB treatment rate more than 90% is predicted in country of Iran FOR 2025. Obviously, the lower mean age of patients reflects the situation of TB control is worse and upper mean age reflect it is better. In this study 39.5% of patients were in urban area which is similar with references resource. Primarily in areas with high population density and poor, TB prevalence expected to be high.

Correct diagnosis of pulmonary tuberculosis is one of the problems in medicine and also as an important factor in TB epidemiology. In this study the frequency of patients in age group 35-65 years with 380(47.8%) is more than other age groups and based on the mean age of 44 years for patients can say that the pattern of disease in Ardabil city was slightly different from other places so, in other studies the disease is more in age up 60 years which this difference to became one of the challenges in the city of Ardabil^{7,8,12,14}. In this study, pulmonary TB cases (56.7%) were more than extra-pulmonary cases and also, the most common organ involved in extra-pulmonary TB was lymph with 24.2% which is similar to other provinces patterns^{7,8,14,15}. TB incidence rate in Iran has decreasing trend in recent ten years. The study on 134 countries in years 1997-2006 on TB incidence rate showed that the annually TB incidence decreasing rate is rapidly in high

income countries¹⁵. According to statistics during the study years, the prevalence and incidence of TB in Iran has been decreased from 40 and 24 per 100000 in 2005 to 27 and 17 per 100000 in 2010; respectively. Also, TB incidence rate may be having significantly relation with welfare indicators such as income level, GDP and social conditions.

5. Conclusion

Due to the lack of decrease in the incidence of extra pulmonary tuberculosis in Ardabil province, we should have done more studies about this disease and effected causes for transmit, prediction and treatment of TB in Ardabil province. Also, by considering the affect of age on disease occurrence, it suggested that we most done exact screening in high risk age groups. Also, higher percentage of simultaneous HIV infections and tuberculosis in society and its effect on general health, so screening and early diagnosis of infections, training and doing necessary actions for prediction of people to suffering TB is recommended in future.

6. Conflict of Interest

None

7. References

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