Original Article

Epidemiology of Tuberculosis in Jahrom in 2005-2014

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Abstract

Introduction:
Tuberculosis is a chronic infectious and communicable disease, ranking seventh according to DALY, and predicted to remain so by 2020. The present study was conducted to evaluate the epidemiology of tuberculosis.

Materials and methods:
In this descriptive-analytical study, records of all patients with TB during 2005-2014 were examined. Data were analyzed in SPSS 22 using descriptive statistics, Chi-square test and t-student at significance level P<0.05.

Results:
Out of 114 TB patients, 67.5% were male, 69.3% were infected with pulmonary TB and 6.1% were infected with HIV. Furthermore, the patients were Afghan, 31.6% and 64% of the patients were city dwellers. The highest prevalence of TB (pulmonary and extra-pulmonary) was observed those younger than 40 years old (44.7%). There were no significant differences in types of TB (pulmonary and extra-pulmonary) based on sex, nationality, residing place, age groups and occupations (P>0.05). Meanwhile, a significant difference was observed in terms of exposure to TB cases (P=0.02). No significant differences were observed between patients with pulmonary and extra-pulmonary TB in terms of mean age at diagnosis of TB (P=0.652), whereas significant differences were observed between the results of all TB cases and those using DOTS (P<0.001).

Conclusion:
Given the young age of people with TB, it appears necessary that the barriers to treatment and control programs be addressed, measures be taken to screen and train the high risk population in Jahrom in order to achieve the goals of preventing and controlling TB.

Keywords: Tuberculosis, Pulmonary, Epidemiology, Extra-pulmonary, Jahrom

Introduction

Tuberculosis (TB), an infectious and life-threatening disease with a wide range of clinical presentations, is mostly caused by Mycobacterium tuberculosis, 85% of which present as pulmonary and the rest as extra-pulmonary tuberculosis (1, 2). TB usually engages the apical, posterior and upper lobe of the lung. Clinical signs are

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often specific and include fever, night sweats, weight loss, appetite loss and general malaise. More than 90% of the cases result in coughs that are initially dry in the morning continuing with suppurative coughs and hemoptysis (3). According to global statistics, every second one person is infected with TB bacilli, every 4 seconds one person catches TB, and every 10 seconds one person dies of TB (4).

TB is the deadliest infectious disease among women of reproductive age and most disease-induced orphans have lost their parents to TB (5).

The accepted approach in controlling TB is Directed Observed Treatment Short term (DOTS), which is the correct treatment of the disease preventing the occurrence of new cases of drug resistance (1).

Drug-resistant tuberculosis including multidrug-resistant tuberculosis (MDR-TB) and extensively drug-resistant tuberculosis (XDR-TB) are becoming a major health problem in Iran. In addition, recent reports suggest the development of totally drug-resistant tuberculosis (TDR-TB) in Iran, too (6).

More than 80% of TB patients live in 22 Asian and African countries, including Afghanistan and Pakistan, the eastern neighbors of Iran. Furthermore, the incidence of TB in Iraq, the western neighbor of Iran, is on the rise in recent years due to political events and regime change (7).

Currently, positive smear is the main indicator of incidence of pulmonary TB in Iran (8).

The incidence of TB in Iran is not the uniform throughout Iran, as it is more prevalent in the borderlines such as Sistan-Baluchestan, Khorasan, Gorgan, East Azerbaijan, Khuzestan, and southern shores, but less prevalent in central provinces. According to the Bureau of Tuberculosis and Leprosy of the Center for Disease Control of the Ministry of Health, 14.4 per 100,000 people catch TB in Iran annually (7).

Fars Province has a moderate prevalence of TB, which may be attributed to the anthropological conditions, population and high rate of migration into the province. Also, in terms of screening, diagnosis, and treatment of TB, Fars is a successful province and the second center for treating resistant TB in Iran (9).

Estimates of health and well-being of society based on the available information are necessary to determine health priorities and interventions and the lack of epidemiological data is a limiting factor in the control and prevention of diseases (10). In this regard, since no studies have been conducted on the epidemiological situation of TB in Jahrom (Fars, Iran), the present study was conducted to assess the epidemiology of TB from 2005 to 2014 in Jahrom.

Materials and methods

This descriptive study is a subgroup of secondary analysis studies. All patients diagnosed with TB that presented to or were referred to the CDC department of Health Deputy of the university for treatment were selected by convenience sampling. A questionnaire designed based on research objectives was used to collect the information. The information in patients' files such as age, gender, nationality, place of residence, affected organ, type of the disease, time of incidence, etc. was recorded in information forms. The obtained data was analyzed by SPSS software version 16 using descriptive statistics, Chi-square and t-test

at a significance level of p<0.05. All cases of extrapulmonary tuberculosis (EPTB) were diagnosed by pathology and 64% of patients with pulmonary tuberculosis (PTB) were diagnosed by direct examination or sputum culture. The 36% of pulmonary patients without pathological findings or smear-positive sputum were diagnosed and treated as TB patients according to symptoms and observing chest X-ray and consulting with specialists in infectious or internal diseases. According to the instructions, patients diagnosed more than two weeks after the onset of their symptoms were recorded as delays in diagnosis in their files.

The present study was approved by the Ethics Committee of the Jahrom University of Medical Sciences (IR.jums.REC.1394.147).

Results

Of the 114 registered patients, 67.5% were male, 35.1% were non-Iranian (31.6% Afghans and 3.5% Iraqis) and 64% were urban dwellers. Among the patients, 74 (64%) were diagnosed with positive smear, of whom 45.94% had 3+ intensity; 11.4% were smokers, 9.6% used drugs through inhalation or injection; 10.5% were diagnosed with diabetes, and 6.1% were HIV positive (7 patients) and 15.8 had an uncertain situation. As national TB program has been integrated in Iran's health network, 81.6% of patients diagnosed in the last decade by health centers under the health service system and 18.4% by non-health care network systems such as private offices, prison, etc. were referred to the Tuberculosis Treatment Center for diagnosis and treatment. In this study, 94.7% of patients had a delay in diagnosis. In terms of the type of TB, 69.3% had PTB and only 0.9% had simultaneous PTB and EPTB. The most organs involved in EPTB were lymph nodes (54.88%) and pleura (22.85%), respectively. In terms of treatment results based on all TB cases, 51.8% recovered and 5.3% failed. The highest prevalence of TB (pulmonary and extrapulmonary) was in the under-40-year-old age group (44.7%). The prevalence of PTB and EPTB in men was 67.1% and 68.6%, and 32.9% and 31.4% in women, respectively. Tables 1 and 2 and Figures 1 and 2 show the frequency distribution of TB and TB incidence during the studied years. The incidence of TB in the past ten years did not have a steady trend. It had an upward trend from 2005 to 2008, a decline from 2009 to 2012, and again a rise from 2013 onward.

Table 3 shows the frequency distribution of smear-positive PTB and its incidence rate during the studied years. The incidence rate of smear-positive PTB did not have a steady course in the past ten years, either. The incidence of PTB was rising until 2009 and it had a steady course since then, despite the fact that the incidence of EPTB was relatively stable (Figure 3).

The average weight of patients at baseline was 14.14±55.64, and 36% of patients weighed equal to or less than 50 kg and 64% were over 50 kg.

The mean age at the time of diagnosis was 44.84±20.61 and 51.11±23.14 years, respectively for men and women. The mean age of patients with PTB and EPTB was 48.14±21.60 and 43.12±21.13 years, respectively. The difference was not significant (P=0.652).

In this study, there was no significant difference between PTB and EPTB in terms of gender, nationality, place of residence and job (p>0.05). While the

difference was significant in terms of exposure to TB cases, weight, DOTS and the result of treatment ($p<0.05$). There was also a significant difference between treatment outcome of all TB cases and DOTS ($P<0.001$) (Table 1).

Table 1: Frequency distribution of TB cases in terms of the studied variables

Variable		Pulmonary tuberculosis		Extrapulmonary tuberculosis		All TB cases		P-value
		Number	Percent	Number	Percent	Number	Percent	
Occupation	Simple worker	39	49.4	13	37.1	52	45.6	0.486
	Employee	16	20.3	7	20	23	20.2	
	Housewife	16	20.3	10	28.6	26	22.8	
	Other	8	10.1	5	14.3	13	11.4	
	Total	79	100	35	100	114	100	
History of contact	Yes	21	26.6	4	11.4	28	21.9	0.02
	No	58	73.4	31	88.6	89	78.1	
	Total	79	100	35	100		100	
DOTS	Yes	73	92.4	15	42.9	88	77.2	0.001
	No	6	7.6	20	57.1	26	22.8	
Treatment Outcome	Recorded	58	73.4	1	2.9	59	51.8	0.001
	Completion of the treatment course	10	12.7	32	91.4	42	36.8	
	Treatment failure	5	6.3	1	2.9	6	5.3	
	Absence from treatment	2	2.5	0	0	2	1.8	
	Death	3	3.8	1	2.9	4	3.5	
	Transferred	1	1.3	0	0	1	0.9	
Weight	< 50 (kg)	37	46.8	4	11.4	41	36	0.001
	> 50 (kg)	42	53.2	31	88.6	73	64	
Gender	Male	53	67.1	24	68.6	77	67.5	0.328
	Female	26	32.9	11	31.4	37	32.5	
Place of residence	Urban	49	62	24	68.6	73	64	0.640
	Rural	30	38	11	31.4	41	36	
Nationality	Iranian	46	58.2	28	80	74	64.9	0.067
	Iraqi	4	5.1	0	0	4	3.5	
	Afghan	29	36.7	7	20	36	31.6	

Table 2: Frequency distribution of EPTB cases from 2005 to 2014 in Jahrom

Type of extrapulmonary tuberculosis	Frequency	Percent
Lymph nodes	19	54.31%
Pleura	8	22.85%
Bone	5	14.28%
Skin	2	5.71%
Meninges	1	2.85%
Total	35	100%

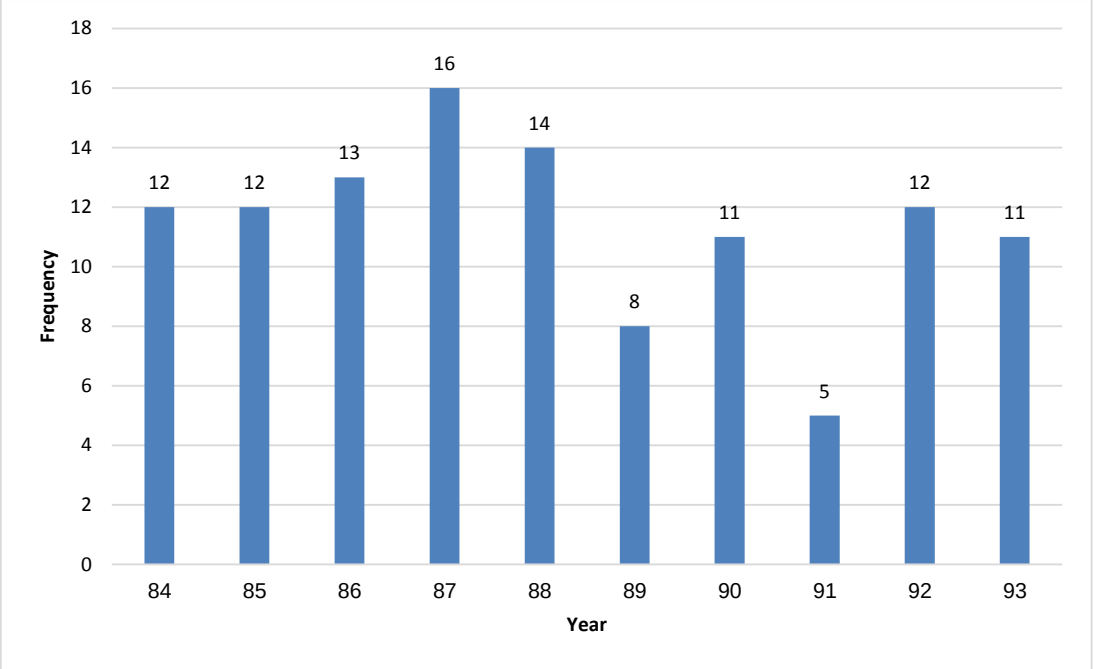

Figure 1: Prevalence of TB from 2005 to 2014 in Jahrom

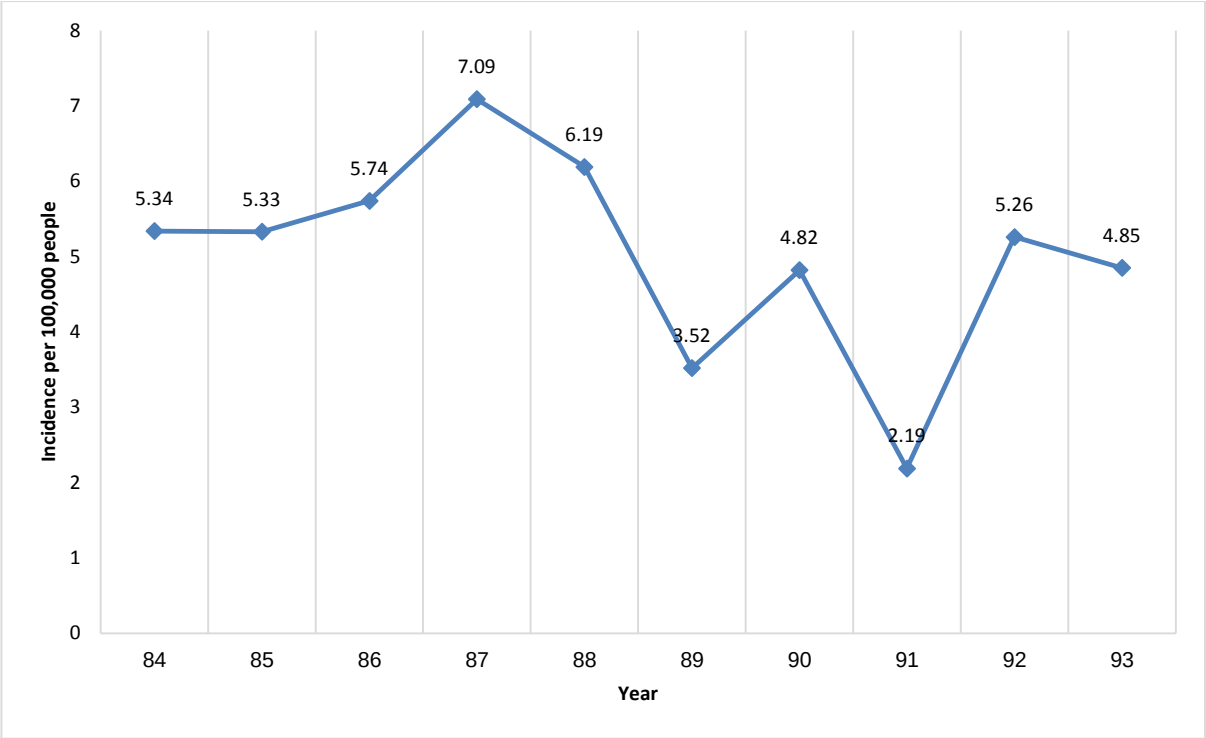

Figure 2: The incidence rate of TB from 2005 to 2014 in Jahrom

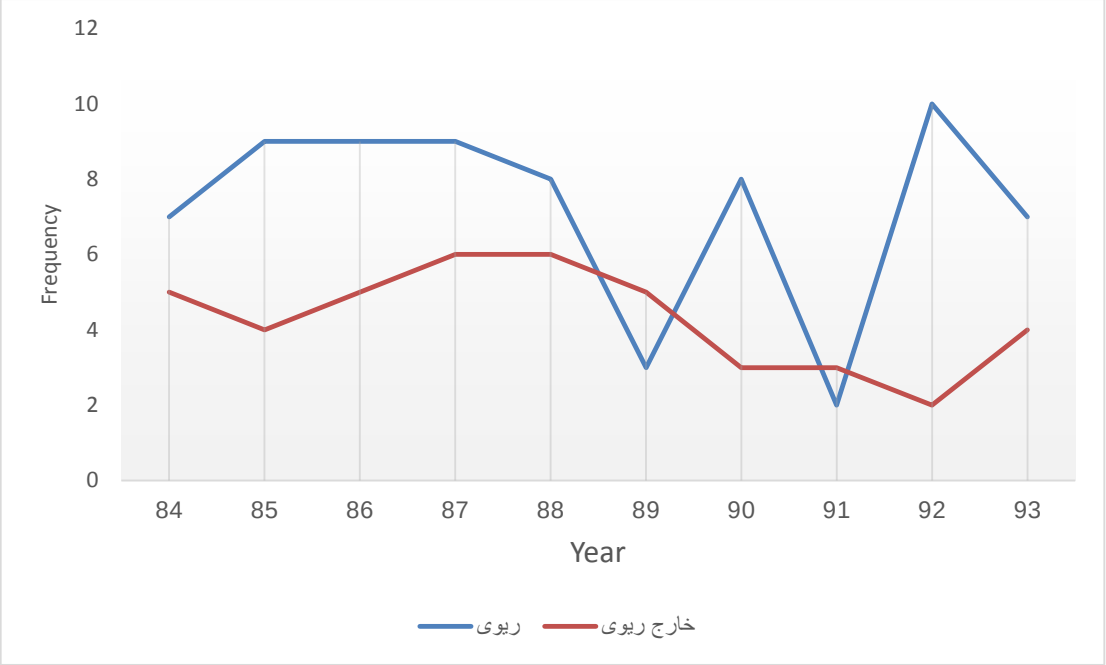

Figure 3: The incidence rate of PTB and EPTB from 2005 to 2014 in Jahrom

Table 3: Prevalence and incidence rate of smear-positive PTB from 2005 to 2014 in Jahrom

incidence in 100,000 people	Population	Frequency Relative (percentage)	Frequency	Year
3.11	224551	9.7	7	84
3.99	225051	12.5	9	85
3.97	226170	12.5	9	86
3.99	225543	12.5	9	87
3.98	226051	11.1	8	88
2.20	226772	4.2	3	89
3.51	227800	11.1	8	90
0.87	227800	2.8	2	91
4.38	227800	13.9	10	92
3.09	226350	9.7	7	93
-	-	100	72	Total

Discussion

The results of this study indicated that the incidence of TB per 100,000 people did not have a steady course in the last decade. The highest incidence of all TB cases (pulmonary and extrapulmonary) in the last ten years was in 2008 and 2009 with an incidence rate of 7.09 and 6.19 cases per 100,000 people and the lowest rate was in 2012 with 2.19 cases per 100,000 people. The highest and lowest rate of positive- smear TB incidence were in 2013 and 2012 with 4.38 and 0.78 cases per 100,000 people, respectively. In a study conducted in Birjand in Iran during 1998 to 2006, the incidence rate of TB was 14.6, 21.8, 40.6, 32.2, 34.4, 31.5, 24.7, 15.8, 17.9, 23.3, respectively (11) which was greater than the incidence rate in the present study. In a 9-year survey in Kurdistan in Iran, the highest and lowest incidence rate of pulmonary smear positive TB were 7 and 3.7 cases per 100,000

people (12). In a study conducted in Mazandaran in Iran from 2004 to 2006, the incidence rate of TB was 9.08, 9.84 and 8.84; and the incidence rate of smear-positive TB was 4.29, 4.35 and 4.03 cases per 100,000 people, respectively (13). Another study in Ardebil in Iran showed that the incidence rate of TB was 8.54 cases per 100,000 people during 5 years (8). The incidence of TB in Afghanistan and Pakistan, which are among the 22 most polluted countries of the world, was over 100 cases per 100,000 people (11, 14). The incidence of TB is not the same everywhere in Iran. According to the Bureau of Tuberculosis and Leprosy of the Center for Disease Control of the Ministry of Health, the incidence rate of all TB cases is 14.4 cases per 100,000 people in Iran(7).

Thus, based on these statistics, although the rate of TB in Jahrom is not high relative to the other provinces, the incidence of smear-positive PTB is somewhat high. Poor economy, culture, and health, small living spaces with a high number of dwelling people, the presence of foreigners in the gardens and the central part of the city might be the cause of TB incidence in Jahrom.

In the present study, 69.3% of all cases were PTB and 8.29% were EPTB which was consistent with the result of Biranvand et al. in southwestern Iran (1), Azni et al. in Damghan (15) Ebrahimzadeh et al. in Birjand (11), Culqui et al. in Spain (16) and Taj al-Din et al. in Sudan (17).

A study by Ministry of Health in 2006 indicated that the most involved organs in EPTB cases were lymph nodes (26.8%), pleura (20.8%) and spine (17.7%). The prevalence of EPTB cases in Iran is higher than the World Health Organization report (18), which might be due to increased HIV infection or wrong diagnosis of EPTB and exaggeration in diagnosis.

The results of treatment in 51.8% of studied patients was full recovery, 36.8% completion of the course of treatment, 5.3% treatment failure, 1.8% absence for treatment, 3.3% death due to TB, and 0.9% referring to other cities to continue treatment. However, since recovered cases are only considered in smear-positive PTB, and since based on the national guidelines all cases of smear-negative and EPTB cases should be recorded as completion of the treatment course, 80.8% of smear-positive patients recovered, 4.1% completed the course of treatment (smear-positive cases should be recorded as completion of treatment course if samples cannot be taken from them for justifiable reasons at the end of the treatment), 6.8% had treatment failure, 2.7% were absent for treatment, 1.4% were transferred to other centers and cities to continue treatment, and 4.1% died because of TB. These statistics were close to the goals of WHO (diagnosis of 75% of TB cases and recovery of 85% of TB patients). The study of Ebrahimzadeh et al. in Birjand in Iran reported 81.7% full recovery, 2.9% death because of disease, 3.3% treatment failure, 4.4% referring to other centers to continue treatment, 1.2% absence for treatment, and 3.3% unknown results (11). Also, a study on 58 patients in Sari in Iran, reported 4.5% treatment failure and 18% completion of the treatment course (19). The frequency of treatment failure and death due to tuberculosis in the present study, both in all cases of TB and in smear-positive PTB was very high.

The mean age at the time of diagnosis was 44.84±20.61 and 51.11±23.14 years for men and women, respectively, which

mainly include the active age group of the society.

Based on national guidelines, patients who are diagnosed within 14 or fewer days from the onset of their symptoms are recorded as no delays in diagnosis (7). In this study, 94.7% of patients had a delay in diagnosis and only 5.3% did not. These results indicate the need for refresher courses for physicians working in health centers and hospitals regarding TB and more attention to chronic coughs in the differential diagnosis. The delay in diagnosing TB, in addition to making treatment harder (secondary prevention), will also increase the risk of disease transmission to other people in the society (primary prevention).

In this study, there was no significant difference between PTB and EPTB in terms of gender, nationality, place of residence and occupation ($p>0.05$), which is consistent with the results of Ebrahimzadeh et al. in Birjand (11), Taghipoor et al. in Qom (10) and Khazaei et al. in Hamadan, (20), while it was inconsistent with the results of Yazdani et al. in Lorestan (5).

There was a significant difference between TB and history of contact with TB patients, weight and DOTS ($p<0.05$). There was also a statistically significant difference between treatment outcome of all TB cases and DOTS ($P<0.001$).

The mean age of patients with PTB and EPTB was 48.14±21.60 and 43.12±21.13, respectively. The difference was not significant ($P=0.62$). These were not consistent with the results of Ebrahimzadeh et al. in Birjand (11).

Conclusion

Due to the high rate of smear-positive PTB in relation to smear-negative and EPTB in this study, early detection of new cases of smear-positive PTB and treatment start after diagnosis requires more precision. Also, due to the high rate of treatment failure in Jahrom compared to other provinces and the entire country, more work is necessary to achieve the goals set by WHO in early detection of the disease as well as the implementation of more effective treatment. Furthermore, due to the young age of people with TB in the present study, it appears that in order to reach the goals and success in the fight against TB, more attention should be paid to the obstacles to the implementation of TB control and treatment programs and the screening and education of these population groups need to be arranged in priority programs of Jahrom health center.

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Conflict of Interest

There is no conflict of interest

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