The Causes and Risk Factors of Tuberculosis Deaths in Khuzestan

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Abstract- Tuberculosis (TB) is one of the 10 leading cause of deaths in developing countries. Understanding the cause and risk factors of TB death and lowering them can reduce its mortality rate. The aim of this study was to assess the cause and risk factors for death of tuberculosis. A retrospective descriptive study was conducted in Khuzestan province in the south west of Iran, from 2002 to 2006. Medical records of tuberculosis cases over the 5-year period were reviewed and death data were analyzed. Including criteria were documented TB diagnosed based on National Tuberculosis Program (NTP). Extracted data were analyzed in SPSS 11.5 system and by chi squared test. One hundred and twenty five deaths (3.15%) with mean age of 48.96±10.03 years were detected. Risk factors for death were: cigarette smoking, diabetes, chronic peritoneal dialysis, MDR-TB, imprisonment, AIDS and injection drug usage. 93 deaths (74.4%) were directly attributed to tuberculosis. Overwhelming TB disease, hemoptysis, AIDS/HIV and MDR-TB were the cause of death with the rate of 69.9%, 11.8%, 9.7% and 8.6%, respectively. 32 (25.6%) deaths were due to medical problems unrelated to TB, among which were cardiovascular diseases, bacterial super infection and cancers with the rate of 25%, 21.9% and 15.6%, respectively. The deaths of TB not only are directly related to TB, but also are caused due to comorbid conditions. Overwhelming TB disease, hemoptysis, cardiovascular diseases, bacterial super infection and cancers are the main cause of death. MDR-TB, imprisonment, AIDS and injection drug usage are the main risk factors for TB mortality.

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Key words: Cause of death, tuberculosis mortality, risk factor, Khuzestan

Introduction

One third of the world population is infected with M.tuberculosis. Eight million new case and two million deaths are reported annually worldwide, in which 12% are due to AIDS/HIV (1). Twenty five percent (25%) of TB deaths in adults in developing countries are preventable2. TB is one of the 10 leading cause of deaths in developing countries (3). Iran with 17.5% prevalence and 27 per 100 000 population incidence rate is 17th country in the ranking worldwide (4,5).

M. tuberculosis after HIV is the most common killer infectious agent in adults worldwide (1). Mortality rate of TB is high, if untreated, 50% will die, 25% will recur and 25% become chronic (2). Although directly observed treatment (DOT) strategy had decreased TB mortality, but, in developing countries, TB is yet the leading cause of preventable deaths (2,4). TB mortality differs in each country regarding to TB epidemiological status,

risk factors and co morbid diseases. The causes of death in tuberculosis patients are divided in two groups. The first directly attributed to TB and in the second, the patients die of complicating medical problems unrelated to tuberculosis, such as cardiovascular diseases, diabetes mellitus, cancers, bacterial super infection and severe drug toxicity (6-8). Kuba et al. showed that 31% of tuberculosis patients died directly due to tuberculosis and 69% died from underlying diseases unrelated to TB. Pulmonary failure due to extensive pulmonary involvement, hemoptysis and TB meningitis were the main causes of TB related death and cancers & bacterial pneumonia were the main causes of unrelated to TB (9). In another study, Mathew and his colleague reported that TB mortality rate was 9.6% and 75% of tuberculosis patients directly died of tuberculosis, 25% of deaths were unrelated to TB and risk factors for death were: older age, previous anti TB treatment, MDR-TB and alcoholism (6).

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The aim of this study was to access and determine the main causes of death and risk factors of tuberculosis patients in the area of study. Meaning of these risk factors and reducing them will decrease mortality rate of tuberculosis.

Patients and Methods

In a retrospective study, medical records of all notified tuberculosis cases over the 5-year period (2002-2006) in Khuzestan province Health Center (south west of Iran) were reviewed and death data were analyzed. Including criteria were documented TB, diagnosed based on National Tuberculosis Program (NTP) (10). Cases with at least 2 sputum smear positive for acid fast bacillus(SSP-AFB) or ,a chest radiography (C-X ray)suggestive of tuberculosis plus 1 SSP-AFB or, sputum culture positive for M. tuberculosis and 1 SSP-AFB were defined as smear positive pulmonary tuberculosis(PTB+).

Cases with clinical finding suggestive of TB plus 3 sputum smear negative for AFB after 3 weeks of antibiotic therapy plus C-X-ray (suggestive of TB) were defined as smear negative pulmonary tuberculosis (PTB-). Other diagnostic criteria were cerebrospinal fluid (CSF) analysis for TB meningitis and CT-scan study for miliary or extra pulmonary tuberculosis (EPTB).

Demographic characteristics, medical history, imprisonment, HIV serology status, drug addiction, underlying diseases, drug side effects and other medical problems during anti TB treatment were derived out from their medical files in Razi hospital and KHC. Finally, data were analyzed in SPSS11.5 system and by chi squared test.

Results

Of total 3960 cases (63.3% PTB and36.7% EPTB) who initiated anti-TB treatment, 125 cases (3.15%) with mean age of 48.96 year and SD of 10.03 died during treatment. Ninety two (73.6%) died during in the first 2months of therapy. Ninety three deaths (74.4%) were directly attributed to tuberculosis. Overwhelming TB disease was the cause of death in 65 case (69.9%), among them majority died due to respiratory failure.11 (11.8%) died of massive haemoptysia, 9(9.7%) died due to AIDS/HIV. Eight (8.6%) died due to multidrug resistant (MDR-TB). 2(2.15%) died of TB meningitis and miliary TB and 2(2.15) due to hemothorax. Thirty two (25.6%) were died of medical problems unrelated to TB. Eight patients (25%) from cardiovascular diseases, seven patients (21.9%) died as a result of bacterial super

Table 1. Risk factors of death among tuberculosis patients in Khuzestan, Iran, 2002-2006

Risk factor	TB cause N=93 N (%)	Non TB cause N=32 N (%)	P
Age : (year)			
<30	5(5.37)	1(3.12)	0.333
30-60	78(83.87)	25(78.13)	0.167
>60	10(10.78)	6(18.75)	0475
Sex :			
Female	31(33.33)	13(40.62)	0.000
Male	62(66.67)	19(59.38)	0.000
Smoking	26(27.95)	13(40.62)	0.000
HIV	16(17.20)	1(3.12)	0.06
Prison staying	23(24.73)	5(15.63)	0.000
IDU	23(24.73)	5(15.63)	0.000
Diabetes mellitus	10(10.75)	10(31.25)	0.001
Dialysis	2(2.15)	6(18.75)	0.036
AIDS	9(9.6)	0(0)	0.000

HIV indicates Human immunodeficiency virus; AIDS, Acquired immunodeficiency syndrome; IDU, Injection drug user.

infection and sepsis, five patients(15.6%) due to cancers,4(12.5%) due to COPD,4(12.5%) deaths were the result of renal failure and peritoneal dialysis, 3 (9.4%) due to diabetic ketoacidosis and one patients due to drug induced hepatitis. Other results are shown in tables 1 and 2.

Table2. Cause of death in tuberculosis patients in acute phase and continue phase of treatment

Cause of death	Acute phase N=92 N(%)	Continue phase N=33 N(%)	P
TBcause:	68(73.9)	25(75.7)	<0.001
Ext. lesions	49(53.2)	16(48.4)	0.000
AIDS	3(3.2)	6(18.2)	0.012
MDR-TB	0(0.0)	8(24.2)	0.000
Haemoptysia	10(10.8)	1(3.0)	0.093
Meningitis	3(3.2)	0(0.0)	0.000
Non TB cause	24(26.1)	8(24.2)	<0.001
Cardiovascular	6(6.5)	2(6.0)	0.036
Cancer	3(3.2)	2(6.0)	0.100
Bacterial inf.	4(4.3)	3(9.1)	0.029
Dialysis	3(3.2)	1(3.0)	0.250
Dka	3(3.2)	0(0.0)	0.000

AIDS indicates Acquired immunedeficiency syndrome; Ext. lesions, extensive pulmonary lesions; MDR-TB, Multi drug resistant tuberculosis; Dka, Diabetic keto acidosis;

Acute phase, First 2 months of treatment; continue phase, remaining months of treatment.

Discussion

This study showed that mortality rate of tuberculosis in Khuzestan was 3.15%, consistent with previously reported by Kourbatova et al. (11), but higher than reported by Xie et al. (12).This finding reflects that TB management in Khuzestan like other developing countries is far from developed countries. Despite employing DOTS strategy since 1997 in the area of study (10) ,mortality rate of TB is yet not acceptable and current TB surveillance most be improved. Risk factors for death in our study were male for TB cause and female for unrelated TB cause, cigarette smoking, diabetes, chronic peritoneal dialysis, MDR-TB, imprisonment, AIDS and injection drug usage (IDU) which were consistent with some previous studies (6-9,11-13). In contrast to other studies HIV infection and old age were not risk factors for death in this study (p>0.05).In the present study majority of deaths occurred early in the course of treatment, with 73.6% dying within the first 2 months of therapy that reflects delayed time between diagnosis and starting of treatment (more than 2 months).

These finding suggest that active case finding can reduce TB mortality rate by earlier detection and treatment.

This study showed that the deaths of TB not only are directly related to TB but, also are caused due to co morbid conditions, such as cardiovascular, uncontrolled diabetes mellitus, cancers and bacterial super infection. This finding is similar to other studies (6-9,11-13).

In comparison with other reports, non TB cause of death in this study (25.6%) is lower than those conducted in low-incidence developed countries (8,12) with the rate of 36.6% to 58% but, is consistent with the same–incidence country (6). In the present study, we found that fibrotic and cavitary lesions in the lungs predispose patients to superimposed bacterial infection such as severe and life threatening pneumonia and sepsis , this finding is similar to other reports conducted by Kuba et al. and Tocque et al. (21.9% vs. 20%) (9,13). Early detection and appropriate using anti microbial drugs can save the life of TB patients. We suppose that TB worsen this co morbid diseases and place them at increased risk of dying, establishing a systematic approach to screening and treatment this medical problem will decrease TB mortality rate. Majority of TB related death in this study was due to extended and severe damaged lesions in the lung (diagnosed by lung CT-scan or chest-X-ray) consistent with the works of Kuba et al., Tocque et al and Kourbatova et al (9,11,13). This finding reflects that

diagnosis and treatment of TB are made at the end staging phase due to missed time of TB detection (with nearly 2months delay as mentioned previously), so we reemphasis on improvement of TB surveillance in Khuzestan and even through Iran. MDR-TB was associated with death in this study, these deaths are unlikely to be the consequence of delayed diagnosis, but rather, reflects poorer prognosis and outcome on second line anti tuberculosis therapy (1,6).

This study also showed that IDU and AIDS were associated with increased risk of death. High prevalence of drug addiction among Iranian prisoners and regarding to the fact that majority of HIV/AIDS in Iran (more than 60%) are due to needle sharing among drug addicts (14-16), we suggest that active surveillance HIV/AIDS in prisons, especially in addict holding units may reduce TB mortality rate. In conclusion, despite employing DOTS strategy since 1997 in Khuzestan (10), mortality rate of TB is yet not acceptable, the deaths of TB not only are directly related to TB but, also are caused due to co morbid conditions and majority of deaths occurred early in the course of treatment, mostly within the first 2months of therapy. Delayed time of TB detection and treatment, IDU, MDR-TB and imprisonment are the main risk factors for TB mortality.

Recommendation

To decrease TB mortality we recommend fallowing:
1. Current TB surveillance should be revised.
2. Active case finding for earlier detection and treatment of TB be employed.
3. Active surveillance HIV/AIDS in prisons especially in addict holding units.
4. Stablishing a systematic approach to screening and treatment co morbid diseases

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Conflicts of interest statement

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